

as they saw fit.²⁵⁹ Neither of these statutes has ever been found applicable to the exercise of the Commission's spectrum management responsibilities.

80. Opponents who have raised challenges under appropriations law have essentially claimed that we are selling spectrum to Nextel in a private sale and using the proceeds to address the public safety interference problems in the 800 MHz band. In fact, what the Commission is doing is proceeding, under its broad section 316 license modification authority, to restructure the 800 MHz band in order to serve significant public interest concerns. In doing so, we set forth a spectrum management plan that provides additional spectrum for public safety and leaves Nextel and the other licensees in a comparable position to where they were before the band restructuring. Courts have repeatedly upheld our authority to implement a new spectrum management plan by modifying licenses when it is in the public interest to do so and to allocate the relocation costs associated with license modifications among the affected licenses.²⁶⁰ And, as noted at ¶ 69 *supra*, neither the *Ashbacker* doctrine nor Section 309(j) poses a barrier to the implementation of our public safety rebanding plan.

81. The appropriations laws do not limit the Commission's power to accomplish rebanding for public safety or to recognize and facilitate Nextel's role in that rebanding. Critically, radio spectrum is not appropriated by Congress and it cannot be obligated, expended, or deposited in the Treasury under those laws. Radio spectrum is a public resource of the United States that Congress has authorized and directed the Commission to manage in the public interest. Indeed, the Commission's most basic spectrum-management power is to assign spectrum to achieve public interest benefits *other than* monetary recovery. Until the enactment of Section 309(j) in Omnibus Budget Reconciliation Act of 1993,²⁶¹ the Commission never obtained cash payments for spectrum. Through spectrum allocation and license assignments, it accomplished public interest objectives such as encouraging the provision of particular types of service, fostering new technologies, or promoting services for underserved customers.²⁶² Even after the Commission was given auction authority, section 309(j)(7) prohibits the Commission from basing the decision whether to auction spectrum on a desire for federal revenue.²⁶³ Even when the Commission does use the auction mechanism, moreover, monetary recovery is just one of several factors the Commission must consider in establishing bidding qualifications and license conditions.²⁶⁴

²⁵⁹ See *Scheduled Airlines Traffic Offices, Inc. v. Department of Defense*, 87 F.3d 1356, 1360 (1996).

²⁶⁰ See ¶¶ 64-67 *supra*.

²⁶¹ Pub. L. No. 103-66, § 6002, 107 Stat. 312, 387-397.

²⁶² See, e.g., *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, First Report and Order and Third Notice of Proposed Rulemaking*, 7 FCC Rcd. 6886 (1993) (reallocating 220 MHz spectrum for emerging technologies); *Amendment of Part 90 of the Commission's Rules to Create the Emergency Medical Radio Service, Report and Order*, 71 Rad. Reg. 2d 1305 (1993) (assigning frequencies to improve the communications capabilities of entities providing life support activities); *Basic Exchange Telecommunications Radio Service Report and Order*, 3 FCC Rcd 214 (1988) (establishing a rural radio service designed to make basic telephone service more accessible to household and businesses); and *Educational Television, Report and Order*, 39 FCC 846 (1963) (establishing Instructional Television Fixed Service (ITFS) for the transmission of instructional material to schools). See also 303(g) ("[T]he Commission ... as public convenience, interest, or necessity requires shall ... [s]tudy new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective uses of radio in the public interest.")

²⁶³ See 47 U.S.C. 309(j)(7).

²⁶⁴ See 47 U.S.C. 309(j)(3).

82. Allocating spectrum to establish a long-term solution to the public safety interference problem and support the associated rebanding is a valid use of spectrum in the public interest. As already noted, the Commission is *required* under Sections 1 and 303 of the Act to use its spectrum assignment powers to promote public safety. And as discussed at ¶ 63 *supra*, the Auction Reform Act of 2002 specifically identified the interference problem in the 800 MHz band as one that the Commission might resolve by allocating spectrum from outside the 800 MHz band.

83. We also conclude that the anti-windfall payment from Nextel directly to the United States Treasury does not raise appropriations laws issues. As discussed in ¶ 76 *supra*, the D.C. Circuit upheld in the *Mtel* case the Commission's authority to require payment under Section 4(i) to "ensure the achievement of the Commission's statutory authority to grant a license only where the grant would serve the public interest, convenience and necessity" (*citations omitted*). Here, the anti-windfall payment is a valid regulatory requirement that serves the public interest because it addresses uncertainty about the exact amount of relocation costs for the 800 MHz and 1.9 GHz bands and obligates Nextel to pay the relocation costs in the 800 MHz band and its share of the costs in the 1.9 GHz band. If the relocation costs are at the low end of the projected range, the anti-windfall payment would ensure that the savings would benefit the public, rather than Nextel.

84. Thus, we conclude that the situation here differs from the facts in a 1963 Comptroller General decision on which Verizon heavily relies in opposing the plan we adopt today. In the 1963 decision, which was overruled in 1972, the Comptroller General reviewed an arrangement in which a non-profit organization raised funds to finance a teacher training program and zoo guidebook by installing a coin-operated audio tour system on government property; the Comptroller General concluded that the arrangement violated both the ADA and the MRA.²⁶⁵ Specifically, the Comptroller General found that Congressional authorization was needed for such an arrangement because the applicable public contracts statute provided that the use of government property by outside parties "shall be for money only."²⁶⁶ Thus, the Comptroller General concluded that the grant of the concession to the non-profit organization would be permissible "only for a solely monetary consideration; if, on the other hand, a monetary consideration were provided, the money would be required to be deposited in the Treasury and would not be available for the proposed uses [for teacher training and a zoo guidebook] unless appropriated therefore by the Congress."²⁶⁷ Here, the Commission's action does not involve a concession or privilege subject to the government contracts statute in the zoo case, nor does it involve a "contract or other obligation for the payment of money" pursuant to the ADA.²⁶⁸ Furthermore, even if the ADA were otherwise implicated, Sections 1, 4(i), 301, 303, 309(j), and 316 of the Communications Act provide the Commission with the authority necessary to adopt the public safety rebanding plan. Accordingly, today's spectrum management plan is "authorized by law" under the ADA.²⁶⁹

²⁶⁵ *To the Sec'y, Smithsonian Inst.*, 42 Comp. Gen. 650 (1963), *overruled*, 51 Comp. Gen. 506 (1972).

²⁶⁶ *Id.* at 652-653 (*citations omitted*).

²⁶⁷ *Id.* at 653.

²⁶⁸ *See* 31 U.S.C. 1341.

²⁶⁹ *See PLC Construction Services, Inc. v. United States* 96 Fed. Appx. 672 (April 7, 2004) (U.S. Bureau of Reclamation did not violate ADA even though contract obligated Bureau to pay more than \$33 million for construction project before Congress appropriated the funds because Bureau was separately authorized to enter into contracts under other provisions providing for the reclamation and irrigation of lands by the federal government); *cf. Association of Civilian Technicians v. Federal Labor Relations Authority*, 269 F.3d 1112 (D.C. Cir. 2001) (court vacated finding by Federal Labor Relations Authority that collective bargaining agreement that would reimburse (continued....))

85. With respect to the MRA, the Communications Act does not require the Commission to auction the 1.9 GHz spectrum. Rather, as discussed *supra* at note 237, section 309(j)(6)(E) gives the Commission broad authority to create or avoid mutual exclusivity in licensing, based on the Commission's assessment of the public interest. The MRA does not nullify the discretion that Congress gave to the Commission and preserved in Section 309(j).²⁷⁰ Here, the principle that funds received for the government should be deposited in the Treasury is fully satisfied, because any cash payment that may be required to protect against a windfall in favor of Nextel will be made to the Treasury, and there are no other government receipts.

86. The Commission has determined that the public interest requires the dedication of new spectrum to addressing the 800 MHz interference problem, and the 1.9 GHz spectrum is uniquely suited to that purpose. Those are public interest judgments for the Commission to make, and they are not changed by the possibility of a greater dollar recovery for the government from auctioning the 1.9 GHz spectrum. Given the vital public safety interest served by this *Report and Order*, moreover, we believe that it is essential to act promptly in this matter. Nonetheless, we recognize that parties have raised novel issues regarding appropriations law and that the Comptroller General is reviewing those issues. Should the Comptroller General unambiguously conclude that our order violates the appropriations statutes, we will address—either on our own motion or on that of moving parties—whether it is appropriate to stay the effect of some aspects of today's order pending a final decision by the court of appeals on any application for review.

87. Furthermore, we will ensure that the public is protected against potential claims by Nextel relating to any 800 MHz reconfiguration costs that it chooses to incur. Specifically, as a condition precedent to commencing operations with the 1.9 GHz band pursuant to any of its licenses modified pursuant to this *Report and Order*, Nextel shall file with the Commission an acknowledgement acceptable to the Commission. The acknowledgement shall state that, by accepting the license modification under the terms of the Order, Nextel acknowledges that it has studied the law and the facts and has made its own estimate of the risks that implementation of the Order may be delayed by judicial review and the Order may, in fact, be declared invalid. Nextel shall further acknowledge that the Commission has not participated in its assessment and is not privy to it, and does not in any way warrant any of the premises upon which Nextel's assessment may be based. Nextel shall acknowledge that it has accepted the risk of delay and invalidity and that, therefore, it cannot recover its costs or any damages associated with implementation or non-implementation of the Order from the Commission or any governmental entity.

B. Interference Abatement

88. Two basic approaches to interference abatement have emerged from the extensive record in this proceeding:

- Application of a variety of technical techniques including those in the *Best Practices Guide*

(Continued from previous page) _____

employees for out-of-pocket losses resulting from agency cancellation of previously approved leave would violate the Anti-Deficiency Act and remanded the decision for the Authority to consider whether the disputed provisions are "authorized by the collective bargaining law").

²⁷⁰ Cf. *Brazos v. U.S.*, 49 Fed. Cl. 398, 411 (Fed. Cl. 2001) (pre-existing contracts – not the MRA – govern whether the Rural Utilities Service (RUS) should assess a \$16.5 million penalty against an electric utility for prepayment of a promissory note; the MRA merely required the RUS to deposit prepayment funds with Treasury once they were received).

as well those contained in Motorola's *Technical Toolbox*²⁷¹ and the 800 MHz User's Coalition Balanced Approach filing.²⁷²

- Reconfiguration of the 800 MHz band to segregate non-cellular systems from systems using cellular architecture, *i.e.* ESMR and cellular systems.

We do not find these two approaches mutually exclusive; indeed, our ultimate conclusion is that achieving satisfactory interference abatement will require both band reconfiguration and application of Enhanced Best Practices. Moreover, we believe Enhanced Best Practices will play a vital role in protecting the integrity of public safety communications during the transition period to a new 800 MHz band plan and after reconfiguration is complete. Our decisions today on how to best abate unacceptable interference rest on the record as well as on analyses of the nature of interference being encountered and the conditions under which a non-cellular 800 MHz licensee should be able to claim entitlement to interference protection.

1. Types of Interference

89. The predominant types of interference encountered by public safety and other 800 MHz non-cellular systems are intermodulation interference and OOB interference.²⁷³ Some parties claim that most of the interference is of the intermodulation type; others contend that the division between intermodulation interference and OOB interference is approximately equal.²⁷⁴ This disparity in opinion may be due to the difficulty of identifying the exact interference mode under field conditions with limited measurement apparatus and the fact that interfering channels may or may not be simultaneously active at a

²⁷¹ Motorola described its *Technical Toolbox* in a series of *ex parte* letters to the Commission. *See, e.g.*, Motorola May 6 *Ex Parte*, Letter, dated May 30, 2003, from Mary E. Brooner, Motorola, to Marlene H. Dortch, Federal Communications Commission, WT Docket No. 02-55 (attaching May 29, 2003 presentation to the Office of Engineering and Technology) (Motorola May 30 *Ex Parte*); Letter, dated June 20, 2003, from Steve B. Sharkey, Director, Spectrum and Standards Strategy, Motorola, Inc. to James D. Schlichting, Esq., Federal Communications Commission, WT Docket No. 02-55 (Motorola June 20 *Ex Parte*).

²⁷² Collectively, Enhanced Best Practices. *See* ¶ 16 *supra*.

²⁷³ Various parties have divided OOB into more specific categories such as adjacent channel interference, sideband noise, and phase noise. *See, e.g.*, Cingular Comments at 7; Ameren Reply Comments at 4. Except where the context requires otherwise, we will subsume all of these categories under OOB. Some interference encountered by public safety mobiles or portables is caused by what commenting parties have variously characterized as receiver "overload," "desensing," or gain compression. Motorola defines both overload and desensing as, "[a]n informal term often used to describe a scenario where a receiver is functioning other than expected, presumably due to excessive signal power at the receiver RF input port." Motorola July 18 *Ex Parte* at 3. Gain compression occurs when a nearby undesired signal or signals are so exceptionally strong that they exceed the amplification capability of the first active devices in the radio receiver, such that the gain of these active devices begins to decrease with increasing levels of undesired signal(s). It is often defined by the 1 dB compression point—the point at which undesired strong signals reduce the gain of an active device by 1 dB. In some instances of these modes of interference, other circuits in the radio are implicated, such as automatic gain control (AGC) circuits.

²⁷⁴ *See, e.g.*, New York State Comments at 7, 9 (adjacent channel interference is primary cause); Fort Lauderdale Comments at 5 (signal overload is the primary problem); Motorola Comments at 18 (5th order intermodulation interference is the most common type of interference).

given time.²⁷⁵

90. *OOBE Interference.* No radio transmitter can confine its emissions to an assigned channel; some signals invariably “spill over” into adjacent spectrum, i.e., all transmitters create some degree of OOBE. The Commission’s rules specify the maximum permissible OOBE of single ESMR and cellular transmitters. However, there is no Commission rule governing the maximum OOBE that a multiple-channel cell can radiate. Moreover, cell OOBE increases cumulatively as a function of the number of channels active in a given cell or in nearby cells, e.g., a public safety receiver could receive cumulative OOBE from an ESMR cell and a nearby cellular cell. Filters on ESMR and cellular transmitters are effective in reducing OOBE. However, as with all such filters, they are less effective on frequencies close to the transmitter frequency; e.g., a filter may not be as effective in significantly reducing OOBE interference to a public safety receiver attempting to receive a signal on a channel immediately adjacent to the channel being used by a nearby ESMR or cellular cell.

91. *Intermodulation Interference.* This kind of interference occurs in 800 MHz receivers when signals in use at a given cell—or a nearby cell—have a given, readily calculable, mathematical relationship²⁷⁶ and are strong in an area in which a public safety mobile or portable unit is attempting to communicate.²⁷⁷ When strong signals with the appropriate mathematical relationship are presented to the public safety receiver, they cause the active elements in the first stages of the receiver to operate in a non-linear manner.²⁷⁸ The incoming undesired signals mix in the receiver and produce a third frequency—an intermodulation product—which can either correspond or fall near the frequency on which the user of the radio is attempting to communicate.²⁷⁹ If the resultant new signal generated in the first stages of the receiver is sufficiently strong, it can effectively block the incoming signal, rendering the radio unusable at that location.²⁸⁰ The concept of mixing occurring in non-linear devices is sometimes analogized to color

²⁷⁵ Recently, Motorola recommended a measurement technique that allows a more refined analysis of the source of interference. However, even with use of this technique, Motorola’s own field tests showed that it was not always possible to characterize interference. See Motorola June 20 *Ex Parte* at 8.

²⁷⁶ Intermodulation products are categorized according to “order” and can result from the interaction of two or more frequencies. Thus, in the case of two-frequency (F1 and F2), third-order, intermodulation, the intermodulation products (P) within the 800 MHz band are calculated by: $P_{\text{intermod.}} = 2*F1 - F2$ and $P_{\text{intermod.}} = 2*F2 - F1$. The fifth order, two frequency intermodulation products within the 800 MHz band are calculated by: $P_{\text{intermod.}} = 3*F1 - 2*F2$ and $P_{\text{intermod.}} = 3*F2 - 2*F1$. Intermodulation products can also be generated by interaction of three or more transmitters, for example, some third-order, three frequency (F1, F2 and F3) intermodulation products falling in the 800 MHz band can be calculated by $P_{\text{intermod.}} = F1 + F2 - F3$ and $P_{\text{intermod.}} = F2 - F1 + F3$. In general, within the 800 MHz band, fifth order and higher intermodulation products are less significant than third-order products. The greater the number of frequencies involved, the greater the number of intermodulation products generated.

²⁷⁷ See Nextel Comments at 19.

²⁷⁸ *Id.* The first stage of a receiver is usually an amplifier. See also *Best Practices Guide* at 9.

²⁷⁹ See Nextel Comments at 19.

²⁸⁰ See Island SMR Comments, Exhibit A at 10. However, receiver components are not the only source of intermodulation products. A junction of dissimilar metals, when presented with strong signals, can generate intermodulation products. For example, some parties have identified corroded bolts on base station towers as a source of intermodulation products. If a base station combiner allows signals from the final amplifier of one transmitter to enter the final amplifier of another transmitter, the two signals can mix, due to non-linearities in the final amplifiers, and the resultant intermodulation product is radiated from the cell antenna. See *ex parte* communication, dated May 27, 2003, from RACOM, Inc. and I.E. Communications to Michael J. Wilhelm, Esq., (continued....)

mixture. Thus, if a receiver were presented with a strong "blue" ESMR signal and a strong "yellow" cellular signal, the two colors could mix in the first stage of the receiver and form an interfering "green" signal that fell on a public safety frequency. The "mixing" concept is important to the understanding of intermodulation interference because it explains how two or more signals, widely separated (in frequency) from a public safety channel can still generate interference. It is significant here, because locating public safety channels in the lower portion of the band—as far as possible from the ESMR and cellular channels—would provide significant relief from interference on the public safety channels. However, it still leaves open the possibility that ESMR and cellular channels, separated from public safety channels by as much as ten megahertz, could mix in the first stage of the public safety radio and form an intermodulation product—that could fall within the channel the public safety radio is tuned to. Under this scenario, if the two ESMR and cellular signals are strong enough, and the radio does not have good intermodulation rejection capability, interference could still result.

2. Entitlement to Interference Protection

92. In order to implement technical and procedural rules for interference abatement, we must first determine the criteria by which licensees will be entitled to interference protection. At the core of this determination is how to define exactly what constitutes "unacceptable interference" to public safety and other non-cellular 800 MHz systems. With an objective standard for unacceptable interference established, all 800 MHz licensees would have certainty regarding their respective rights and obligations. As a result, licensees will be able to readily identify in what circumstances they can reasonably expect to operate free from unacceptable interference. We emphasize, however, that our determination on what constitutes "unacceptable interference" applies solely to this proceeding.

a. Introduction

93. Historically, the Commission has imposed limits on the area in which land mobile communications systems with given characteristics—effective radiated power (ERP), frequency, antenna height, geographical separation, *etc.*—can expect substantially interference-free operation from other systems. For instance, in some bands, our Rules define these areas geographically, *e.g.*, a public safety system in certain bands can expect interference protection because our Rules prohibit co-channel stations within seventy-miles of the protected station.²⁸¹ In other bands, public safety has a "protected contour" that defines the area in which interference protection from other co-channel or adjacent channel systems can be expected, *e.g.* a 37 dBμV/m contour (VHF) or a 39 dBμV/m contour (UHF).²⁸² Under either protection scheme—distance separation or protected contours—the signal level at which the public safety system no longer can expect interference protection is well above the typical receiver noise floor.²⁸³

94. Consequently, when frequencies are assigned based on distance separations or protected contours, the area in which a licensee may operate is limited by the potential of interference from nearby systems, *e.g.* the potential for interference defines the area within which a public safety signal is intelligible, not merely by the strength of the public safety signal above the receiver noise floor. Given

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Federal Communications Commission. It also has been suggested that ferrite used in base station isolators has nonlinear properties that support generation of intermodulation products. *See, e.g., Motorola June 20 Ex Parte* at 1.

²⁸¹ *See* 47 C.F.R. § 90.621(b).

²⁸² *See* 47 C.F.R. § 90.187(b)(2)(iii).

²⁸³ The "noise floor" is the cumulative value of noise generated internally in the receiver and environmental noise, such as that created by automobile ignition systems, high voltage electrical transmission lines and a host of other "incidental radiators." *See* 47 C.F.R. § 15.3.

this fact, we believe that it would be inappropriate, as a matter of responsible spectrum management, to afford public safety systems the noise-limited coverage that some proponents have recommended.²⁸⁴ For example, were we to do so for a given public safety system in the 800 MHz band, it would not only restrict the availability of public safety spectrum in adjoining areas but also would make it virtually impossible for CMRS systems to use channels that contributed the slightest amount of noise to a public safety receiver in the far fringes of its noise-limited coverage area. Such an outcome would result in inefficient utilization of CMRS spectrum. Moreover, the substantial set of measures we are adopting here will provide public safety systems with strong protections against interference, rendering this particular measure unnecessary.

95. We also conclude we should adopt an interference protection standard in the 800 MHz band based on measured, rather than predicted signal strength. While one approach would be to define the coverage area of public safety system by a predicted signal contour, signal level prediction is an inexact science and 800 MHz radio signal propagation can be affected by multiple factors such as buildings and other obstructions, reflection of signals from nearby man-made surfaces, terrain, and foliage. Moreover, system designers frequently predict signal strengths in terms of statistical probability, e.g., the charts and algorithms used for coverage determinations predict the distance from a transmitter at which a given level of signal will be equaled or exceeded at fifty percent of the locations fifty percent of the time.²⁸⁵ Thus, while signal strength predictions are useful for obtaining an overall picture of system coverage, we believe they are of limited utility in predicting the strength of an 800 MHz public safety signal in a localized and relatively small area, which is exactly the type of area in which interference may be encountered from an ESMR or cellular system. Consequently, we conclude that we need to use a basis other than distance separations or predicted signal contours in establishing the threshold determination of entitlement to interference protection.

b. Interference Protection Standard

96. In their August 7, 2003 *ex parte* filing, the Consensus Parties proposed a bright-line test for determining non-cellular 800 MHz licensees' entitlement to interference protection.²⁸⁶ The recommended test procedure relies on measured—rather than predicted—minimum median signal strength levels, which, if met or exceeded, would entitle a licensee to interference protection.²⁸⁷ Moreover, the proposal contemplated providing full interference protection only to non-cellular 800 MHz systems that use receivers meeting minimum performance standards.²⁸⁸

97. The proposal defines interference in terms of a parameter known as the carrier²⁸⁹ to interference plus noise ratio $[C/(I+N)]$ of a receiver. The proposal recommended 20 dB as the minimum

²⁸⁴ Some commenting parties suggested the Commission adopt a “zero tolerance” policy whereby any radio system interfering with a public safety signal in the 800 MHz band would immediately have to cease operation until interference-free operation of the public safety system was assured. See City of New York Comments at 5; IACP Comments at 4; City of New York Comments to Supplemental Comments of the Consensus Parties at 8.

²⁸⁵ See, e.g., 47 C.F.R. § 73.699, Figures 9, 10 and 10b.

²⁸⁶ Consensus Parties Aug. 7 *Ex Parte* at 45-50 and Appendix F at 2, § 1.2.

²⁸⁷ *Id.* Appendix F at 3, § 2.1.1.

²⁸⁸ *Id.* Appendix F at 8, § 4.1.1a.

²⁸⁹ “Carrier” in the sense used here, equates with “desired signal;” i.e. the signal from the public safety, CII or other non-cellular base station.

acceptable C/(I+N) ratio for voice systems;²⁹⁰ and suggested that the equipment manufacturer supply the "information value" for non-voice public safety communications systems.²⁹¹

98. The Consensus Parties' proposal requires that a public safety or other non-cellular radio in the band segment be presented with a signal from the desired station that is greater than or equal to a specified minimum before the licensee of the desired station may claim entitlement to interference abatement.²⁹² As proposed in their filing, the threshold desired signal power in the case of portable units in the 806-816 MHz/851-861 MHz band segment is -101 dBm, or greater, as measured at the radio frequency (R.F.) input to the portable radio's receiver.²⁹³ The corresponding value for mobile units is -104 dBm or greater.²⁹⁴ A specific measurement technique was proposed for determination of the threshold signal powers.²⁹⁵

99. The Consensus Parties proposed that full interference protection would be provided only for systems using receivers that satisfy TIA Class A specifications.²⁹⁶ Receivers not conforming to these specifications would be protected only to some higher desired signal threshold power level.²⁹⁷ Several

²⁹⁰ Consensus Parties Aug. 7 *Ex Parte* Appendix F at 2, § 1.2.1.

²⁹¹ *Id.* Appendix F at 2, § 1.2.2.

²⁹² The median received power level for interference protection in the Guard Band at 816-817/861-862 MHz that Nextel later proposed to be designated for non-ESMR operations increases as a function of frequency. See ¶¶ 157-158 & Figure 1 *infra*.

²⁹³ Consensus Parties Aug. 7 *Ex Parte* Appendix F at 3, § 2.1.1a. This level is the power in decibels above one-milliwatt at the R.F. input terminals of a receiver. The Consensus Parties originally proposed a measured desired signal power of -98 dBm, but lowered these values in response to parties who expressed concern that this level was too stringent and that the resultant area of interference free operation would be smaller than the area in which many public safety systems expect reliable coverage. See Comments of Motorola to Supplemental Comments of the Consensus Parties at 11; Comments of NY OIT to Supplemental Comments of the Consensus Parties at 12-14; Comments of San Diego to Supplemental Comments of the Consensus Parties at 7; Comments of Xcel to Supplemental Comments of the Consensus Parties at 6-7; Comments of Con-Ed to Supplemental Comments of the Consensus Parties at 6; Comments of Entergy Reply to Supplemental Comments of the Consensus Parties at 7-8; Reply Comments of NY OIT to Supplemental Comments of the Consensus Parties at 9-10; Reply Comments of San Diego to Supplemental Comments of the Consensus Parties at 7-8; Reply Comments of Xcel to Supplemental Comments of the Consensus Parties at 5-6.

²⁹⁴ *Id.*

²⁹⁵ *Id.*, Appendix F at 9-10, § 5.0. The Consensus Parties made this amendment in response to one commenting party which argued that the Commission should not set a minimum received power level for interference protection unless and until an agreed-upon procedure for measuring the power level had been established. See Comments of New York OIT to Supplemental Comments of the Consensus Parties at 13; Reply Comments of NY OIT to Supplemental Comments of the Consensus Parties at 10-11.

²⁹⁶ See Consensus Parties Aug 7 *Ex Parte*, Appendix F at 8, § 4.1.1. Class A receivers are those intended for an urban environment; Class B receivers are suitable only for rural environments.

²⁹⁷ *Id.* Appendix F at 8, § 4.1.1b. The amount of the increase above the levels described above would be determined by the amount of desired signal power necessary to restore the receiver in question to the same C/(I+N) ratio as a Class A receiver in the same environment. We note that Motorola has reported that approximately 93 percent of its recent portable receiver inventory meets Class A standards. See Motorola November 3 *Ex Parte* at 5, Table 3. Motorola further reported that eighty-five percent of their 2003 year-to-date shipments of mobile radios met Class A standards. *Id.* The most significant difference between the two classes of receivers lies in their (continued....)

parties supported the Consensus Parties in this regard,²⁹⁸ while others disagreed, pointing out that some of the TIA standard parameters, for example, operating temperature range of the radio are irrelevant to 800 MHz interference and therefore that the Commission should not require compliance with the entire standard but, instead, should simply adopt minimum intermodulation rejection ratios for receivers.²⁹⁹

100. On June 16, 2004, Nextel filed a revised band plan for the 816-817 MHz/861-862 MHz band segment proposing that this additional 2 MHz be designated for non-ESMR use rather than for ESMR, as had been proposed in the August 2003 *ex parte* filing. In that band plan, Nextel proposes that the minimum received signal power threshold necessary for interference protection in the 816-817 MHz/861-862 MHz band segment increase as a function of increasing frequency.³⁰⁰

101. As discussed in greater detail below, we conclude, based on the record in this proceeding, that a readily identifiable objective standard should be established to determine what constitutes unacceptable interference, and which systems are entitled to protection from such interference.³⁰¹ We also believe that both unacceptable interference and the scope of protection afforded to eligible systems should be subject to objective measurement criteria. In this connection, we note that almost all participants in this proceeding agree that the *status quo*—addressing interference to public safety systems on an *ad hoc* basis and reactive fashion—is no longer workable in the 800 MHz band. We agree, and find that certain interference definition and measurement procedures contained in the record allow us to establish a reasonable standard for determining when public safety and other non-cellular systems can expect to operate free from unacceptable interference.³⁰² Specifically, we believe that the operational parameters and system characteristics identified by the Consensus Parties are relevant factors in establishing such a standard. However, in determining the final values we drew not only from the Consensus Parties' proposal but also from proposals submitted by equipment manufacturers, industry associations, 800 MHz licensees, as well as our own technical expertise. We further believe that adoption of the unacceptable interference definition and associated measurement procedures is in furtherance of our goal to employ sound spectrum management principles in resolving the 800 MHz interference problem. In addition, we rely, in part, on the methodology derived by the Telecommunications Industries Association TR-8

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intermodulation rejection performance. Class A portable receivers must have at least a 70 dB intermodulation rejection ratio (Class A mobiles must achieve at least 75 dB of intermodulation rejections); Class B portable receivers must have at least a 50 dB intermodulation rejection ratio (Class B mobile receivers must have at least a 70 dB intermodulation rejection ratio). See TIA/EIA -603-A, August 2001 at 124. See also TIA/EIA TSB102.CAAB, August 1994, at 6 and 7. TIA is an American National Standard Institute-accredited standards development organization and provides technical expertise to the telecommunications industry in a wide range of areas, including system performance, interference abatement, compatibility and interoperability. See <http://www.tiaonline.org/about/overview.cfm>.

²⁹⁸ See Comments of Alliant to Supplemental Comments of the Consensus Parties at 1; Comments of Ameren to Supplemental Comments of the Consensus Parties at 14.

²⁹⁹ See Ameren Reply Comments at 4; UTC Reply Comments at 19; Comments of Preferred to Consensus Parties Reply Comments at 11; Comments of UTC to Supplemental Comments of the Consensus Parties at 15.

³⁰⁰ See ¶¶ 157-158 and Figure 1 *infra*.

³⁰¹ See ¶ 105-107 *infra*.

³⁰² This stems from the questions raised in the *NPRM* seeking comment on whether to abate interference by requiring increased public safety signals or by reducing CMRS signals. See *NPRM*, 17 FCC Rcd at 4914 ¶¶ 76-77.

Subcommittee.³⁰³ Based on this analysis, we believe that the measures we adopt here will meet our goal of ensuring that 800 MHz communications critical to the safety of life and property will not be impaired by unacceptable interference.

102. The Consensus Parties recommended that the proposed procedures for defining unacceptable interference and establishing licensees' entitlement to be protected against such interference should not be put into place until reconfiguration of the 800 MHz band had been completed. We disagree. Indeed, it appears to us that establishing an interference abatement entitlement standard must be the very first step in attacking the problem of unacceptable interference to public safety, CII and other non-cellular 800 MHz systems.³⁰⁴ In short, we cannot afford the luxury of awaiting completion of band reconfiguration—and putting critical public safety communications at continued significant risk in the interim—before we determine the conditions under which licensees are entitled to interference protection. Accordingly, our rules for interference protection entitlement and the assignment of responsibility for the abatement of unacceptable interference will become effective sixty days after publication of this *Report and Order* in the Federal Register.

103. We are persuaded by the record that our goals in this proceeding are best met by our bright-line test for interference protection entitlement, coupled with a standardized technical means of determining that entitlement and assigning the task of abating unacceptable interference to the parties best capable of doing so. This approach is, we believe, far preferable—for all concerned—to our attempting to micro manage the technology utilized by the ESMR and cellular industries. Thus, by eschewing imposition of across-the-board new technical standards on the industry, we avoid imposing that unnecessary expense and afford the ESMR and cellular licensees optimum flexibility to design and operate their systems in a manner that will optimize service to subscribers and avoid unacceptable interference to other users of the 800 MHz band. Thus, although we have discussed herein the technical means disclosed in the record to avoid unacceptable interference—especially those that come within the definition of Enhanced Best Practices—we reject as unnecessary, the recommendations of some parties for mandatory restrictions on all ESMR and cellular systems with respect to such parameters as maximum cell ERP,³⁰⁵ combiner technology,³⁰⁶ and specific antenna pattern characteristics.³⁰⁷

104. We also decline to adopt the recommendation of the Consensus Parties that we establish more strict OOB limits for base station transmitters in the 861-895 MHz band.³⁰⁸ Instead, we agree with

³⁰³ See ¶ 108, *infra*. See also Consensus Parties Aug. 7 *Ex Parte* at 48. The TIA TR-8 subcommittee is responsible for mobile and personal private radio standards. See <http://www.tiaonline.org>.

³⁰⁴ See Consensus Parties Aug. 7 *Ex Parte* at Attachment 1.

³⁰⁵ See Motient Comments at 4; Cascade Radio Comments at 2; Supreme Radio Comments at 7; Florida Comments at 8; Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties at 12, 18; Comments of Pinnacle to Supplemental Comments of the Consensus Parties at 9; Comments of UTC to Supplemental Comments of the Consensus Parties at 15; Reply Comments of San Diego to Supplemental Comments of the Consensus Parties at 7.

³⁰⁶ Alliant Energy Comments at 1; UTC Comments at 19; Entergy Reply Comments at 2; Pinnacle Reply Comments at 3-4.

³⁰⁷ With regard to antenna designs, we note that the Commission's Spectrum Policy Task Force (SPTF) recommended that we consider "[p]romoting the use of advanced antenna technology and system design techniques that would enhance the uniformity of transmitted signal strength levels through a service area." See SPTF Report, ET Docket No. 02-135, November 2002, at 32.

³⁰⁸ Consensus Parties Aug. 7 *Ex Parte*, Appendix F at 9 § 4.1.2.

parties such as the Rural Cellular Association, which point out that, in many instances, the additional filtering needed to achieve the Consensus Parties' proposed OOB standards would add cost and complexity—but no benefit—to those cells in a system in which, because of their location, or otherwise, unacceptable OOB interference would not occur.³⁰⁹ In short, although we recognize the efficacy of such technical changes, we are reticent to impose them on every cell of every system in the country; particularly if only a handful of cells in a system might require them. In the final analysis, it is the question of whether unacceptable interference exists or not that is controlling here; not the specific means by which licensees abate it. The technical filings made in this proceeding convince us that licensees are the best stewards of interference abatement technology and are best capable of determining when and to what degree that technology must be applied. However, we reserve the discretion to revisit this issue promptly and impose more specific technical requirements on carriers should our decisions to adopt an objective interference standard and place strict responsibility on carriers to fix any unacceptable interference prove inadequate.

(i) Signal Strength Threshold for Interference Protection

105. In the rules we adopt today, we specify that public safety, CII, and other non-cellular 800 MHz systems must receive at least a minimum measured input signal power of -101 dBm for portable (*i.e.*, hand-held) units and -104 dBm for vehicular mobile units in order to be eligible for protection from interference in the 806-816.35 MHz/851-861.35 MHz band segment.³¹⁰ As an initial matter, we note that these signal strengths are quite low. For instance, a signal strength of -98 dBm is the threshold average radiation sensitivity for a Class A "Project 25"³¹¹ portable receiver with an external antenna.³¹² A signal strength of -101 dBm is about one-half that of a signal strength of -98 dBm, and a signal strength of -104 dBm is about one-quarter that of a signal strength of -98 dBm. Some non-cellular 800 MHz licensees contend that they have designed systems to work with a signal strength less than -98 dBm, and we wish, at the margin, to protect such systems providing they provide, at a minimum, a median -101/-104 dBm received signal power.³¹³ However, we do not agree with parties who aver that their systems operate satisfactorily with signal strengths at or below -120 dBm and should be protected to that low level.³¹⁴ In

³⁰⁹ See Reply Comments of Rural Cellular to Supplemental Comments of the Consensus Parties at 2.

³¹⁰ Note that the signal powers are specified in decibels below one milliwatt and thus are negative numbers. Therefore, for example, a -90 dBm signal is stronger than a -100 dBm signal. For our discussion of 816-816.35 MHz/861-861.35 MHz band segment, see ¶¶ 157-158 *infra*.

³¹¹ "Project 25" was an APCO initiative that resulted in a digital standard which was substantially incorporated into the ANSI/TIA/EIA 102 suite of standards. The TIA standard has been adopted as the mandatory standard for public safety radios operating on narrowband interoperability voice and data channels in the 700 MHz public safety band.

³¹² See TIA/EIA-102.CAAB, November 2002, § 3.1.14. Manufacturers' sensitivity specifications indicate that many Class B receivers meet this limit. The average radiation sensitivity of a receiver is the power received by a halfwave dipole measured into a 50 Ω load when substituted for a receiver that is receiving a signal at the reference sensitivity. See TIA-102.CAAA-A, November, 2002 §2.1.14.1.

³¹³ See Comments of San Diego to Supplemental Comments of the Consensus Parties at 7; Comments of Con-Ed to Supplemental Comments of the Consensus Parties at 6-7; Reply Comments of N.Y. OIT to Supplemental Comments of the Consensus Parties at 10; Reply Comments of San Diego Reply to Supplemental Comments of the Consensus Parties at 7.

³¹⁴ See Comments of Palomar Comm. to Supplemental Comments of the Consensus Parties at 7-8; Comments of Consumers Energy to Supplemental Comments of the Consensus Parties at 18; Reply Comments of Xcel to Supplemental Comments of the Consensus Parties at 5; Peak Relay, February 6, 2004 *ex parte* filing.

light of the fact that the reference sensitivity of 800 MHz receivers is typically on the order of -116 to -119 dBm.³¹⁵ We find that mandatory protection of systems to a level below -104 dBm would impose an excessive burden on ESMR and cellular telephone carriers to protect an extremely weak signal. We note that such signal levels are so weak that normal statistical variation, especially at the periphery of service areas, would result in limited service reliability even in the absence of interference or high levels of ambient noise. Nevertheless, ESMR and cellular telephone licensees must respond to complaints of interference even at these low signal levels; and, when possible, voluntarily assist the affected licensee if to do so does not cause the ESMR or cellular telephone licensee undue cost or capacity limitations.

106. In sum, to provide clarity and transparency to all involved parties, we specify that the public safety or other 800 MHz non-cellular signal will be entitled to protection only if the median power of the received signal is greater than or equal to -101 dBm (portable) or -104 dBm (mobile),³¹⁶ in the 806-816 MHz/851-861 MHz band segment. In the band segment 816-817 MHz/861-862 MHz, measured median signal powers for interference abatement increases as a function of frequency, as described in paragraphs 157-158 and Figure 1, *infra*.

107. In defining the term interference within the specific context of "unacceptable interference" as defined for purposes of this proceeding only and as used herein, we examined the filings in the record, standard technical publications and manufacturers' specification sheets. Our analysis closely tracks that of the Consensus Parties and we define unacceptable interference as any impairment to the desired signal that causes the C/(I+N) ratio of a voice radio receiver to drop below 20 dB. However, because the technical parameters necessary for acceptable performance by non-voice systems vary significantly by system, we will use the value(s) reasonably designated by the manufacturer of the equipment.³¹⁷ We recognize that a manufacturer specification may vary from manufacturer to manufacturer and could well change over time as particular equipment evolves.³¹⁸

(ii) Signal Measurement Techniques

108. As an initial matter, all parties involved in a determination of unacceptable interference are free to agree among themselves on how interference protection threshold levels are to be measured. For example, in many cases, it may be possible to measure the desired signal directly because it is not masked by noise or interference to the degree that direct measurement is unreliable. In other instances, it may be possible to conduct a direct measurement reliably if nearby ESMR or cellular telephone transmitters are turned off briefly. However, whenever it is not possible to perform reliable measurements of desired signal received power directly; or in the event there are disputes between or among the parties involved in an interference complaint, the following protocol for indirect measurement of the desired

³¹⁵ See TIA-102.CAAB-A September 2002, § 3.1.4. (minimum reference sensitivity -116 dBm) See also Typical Performance Specifications for Motorola Astro XTS 5000 transceiver. http://www.motorola.com/cgiss/docs/xts5000_service.pdf (reference sensitivity of 0.25 microvolts = -119 dBm).

³¹⁶ Although the Consensus Parties' filings are not clear on the subject, we assume the threshold to be used (-101 or -104 dBm) will be determined by the kind of radio that was in use when interference was encountered. Thus, if the interference complaint originated from a party using a hand-held portable radio, the -101 dBm criterion would apply. However, if the party encountering interference was using a mobile unit, the -104 dBm criterion would apply.

³¹⁷ See Consensus Parties Aug 7 *Ex Parte*, Appendix F at 2, § 1.2.2.

³¹⁸ We note that manufacturers of non-voice equipment generally rely on bit error rate (BER) to specify acceptable system performance, rather than the C/(I+N) ratio used for voice systems. We therefore expect that most manufacturers will specify a BER for non-voice systems.

signal power may be used. These measurement procedures are based on the recommendations of the Consensus Parties with a few minor changes.³¹⁹ Consistent with existing practice, the Office of Engineering and Technology is hereby delegated authority to make changes to this protocol as needed.³²⁰

(a) *Area to be measured.* The area of measurement shall be no less than 91.44 meters x 91.44 meters (300 feet x 300 feet). Local obstructions may determine the size, as well as how large the reported affected area is. If the affected area is quite large, a location of reported problems shall be selected that is large enough to be consistent with coverage predictions and our dBu contour limitations.

(b) *Data collection.* A measurement route shall be defined through the area to be measured that distributes data collection points relatively uniformly across the area being tested. A constant velocity along the route shall be maintained to prevent oversampling in any given location. The sampling rate shall be high enough to ensure multiple samples per wavelength.

(c) *Use of filters.* A lowpass or bandpass filter shall be inserted between the test receiver and its antenna to allow differentiation between receiver-generated IM and OOB noise by attenuating potential IM contributors from the CMRS portion of the band. The filter's loss on the desired frequency shall be included in all calibrations.

(d) *First test procedure.* With all potentially-interfering channels and the desired signal transmitting constantly, gather "continuous" data over a route that covers the measurement area defined in (a) above, using the data-collection requirements in (b) above. Use this data to determine the median C+I+N. Modulate the desired channel with a test signal to verify whether or not the target receiver unmutes. For digital receivers this occurs at a C/(I+N) of approximately 5 dB. For analog radios adjust the manual squelch setting to cause the receiver to unmute at a C/(I+N) of 5 dB.

(e) *First test threshold.* If the median C+I+N is greater than or equal to 2 dB above the median target value and the receiver was unmuted, then the first threshold test is passed and the public safety/CII system is eligible for interference mitigation. If the median C+I+N is not greater than or equal to 2 dB above the median target value, conduct the second test procedure below to establish eligibility for interference mitigation.

(f) *Second eligibility test.* Repeat (d) with the desired signal not transmitting. At this point the test receiver is measuring only I+N. This test should be run as soon as possible to be sure conditions are similar to the initial test. If the test receiver has automatic frequency control, disable it so it remains on the test frequency and is not pulled toward one of the potential interference contributors. Use this data to determine the median I+N. Since the value of N should be a constant (the thermal noise of the receiver) all else will be interference (I). If OOB noise is present it will be captured in this data as I.

(g) *Second test threshold.* Determine the median C based on the median C+I+N and I+N. If the calculated median C is close to the target value, repeat (f) to ensure that I+N has not changed.

³¹⁹ See Consensus Parties Aug 7 *Ex Parte*, at Appendix F, §§ 5.0-5.8.

³²⁰ Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band, FCC 03-287, ET Docket No. 03-122 ¶ 39 (released Nov. 18, 2003).

c. Minimum Receiver Performance Criteria

109. In order for non-cellular 800 MHz licensees to be entitled to full protection against unacceptable interference, they must use mobile and portable voice radios with performance that equals or exceeds the minimum performance standards described *infra*:

- Voice units intended for mobile use: 75 dB intermodulation rejection ratio; 75 dB adjacent channel rejection ratio; -116 dBm reference sensitivity.
- Voice units intended for portable use: 70 dB intermodulation rejection ratio; 70 dB adjacent channel rejection ratio; -116 dBm reference sensitivity.

110. We derived the foregoing values from manufacturers' technical filings contained in the record,³²¹ standard reference works and manufacturers' specification sheets for voice equipment. The data appear to represent the state of the art in affordable public safety and CII radios.³²² We also evaluated the Consensus Parties' recommendation that we require public safety licensees to use receivers which meet TIA Class A standards in order to receive full protection against unacceptable interference.³²³ We decline, however, to adopt the Class A standards on a wholesale basis because: (a) we wish to avoid incorporating technical specifications contained in these standards unless they relate directly to rejection of signals that interfere with 800 MHz public safety communications; and (b) the TIA-102 standard for digital transceivers applies to radios operating with 12.5 kHz bandwidth and thus is inapplicable to radios operating with 25 kHz bandwidth, as is common in the 800 MHz band. Thus, although we did rely, in part, on the TIA-102 standard, we did so only with those portions of the standard that affect intermodulation rejection, adjacent channel selectivity, and receiver sensitivity.³²⁴

111. In setting our criteria for voice receiver performance, we were mindful of the comments of parties which observed that the TIA intermodulation interference testing protocols may not simulate real-world conditions.³²⁵ Thus, although the standards specify that intermodulation interference rejection

³²¹ See Motorola Comments at 21; Motorola November 3 *Ex Parte* at 4.

³²² As with most technical equipment, such radios' performance is bounded by cost and other considerations. For example, the intermodulation rejection ratio of a portable radio is directly tied to the amount of power that the radios' battery can supply. Thus, although a portable radio with an intermodulation rejection ratio better than that specified *supra* could be manufactured; it would either have a battery so heavy that it would not be practical to carry the radio on the person of a public safety official; or, if the battery were light enough to be carried, its amp-hour capacity would not be sufficient for the radio to operate through an entire eight-hour, or more, shift. See Motorola Comments at 20-21; Public Safety 800 MHz Interference, FCC Briefing September 19, 2002 attached to Letter, dated September 20, 2002, from Steve B. Sharkey, Director, Spectrum and Standards Strategy, Motorola, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission at 13 (Motorola September 20 *Ex Parte*).

³²³ Supplemental Comments of the Consensus Parties, Appendix F at F-7-8, § 4.1.1.

³²⁴ Based in part on an absence of evidence in the record suggesting there are issues regarding minimum receiver performance criteria for non-voice equipment, we find it unnecessary at this time to specify any such criteria.

³²⁵ See CTIA Reply Comments at 9-10; Supplemental Comments of the Consensus Parties, Appendix F at F-7, Item 4.1; Comments of CTIA to Supplemental Comments of the Consensus Parties at 10; Comment of Motorola to Supplemental Comments of the Consensus Parties at 20-21.

should be tested with the desired signal at the reference sensitivity of the receiver,³²⁶ under actual operating conditions the desired signal is usually considerably above the reference sensitivity of the receiver. Therefore, we recommend, but do not require, that TIA and other standards-setting organizations revisit current testing procedures in light of the interference environment in which 800 MHz receivers must currently operate.

112. We note that Motorola data show that approximately seventy-four percent of the receivers that it has shipped to public safety agencies over the past decade meet Class A intermodulation rejection specifications and that this percentage is even higher for receivers shipped in 2003.³²⁷ Accordingly, we believe that public safety agencies predominantly already employ receivers which satisfy the criteria above.³²⁸ However, we are not restricting entitlement to unacceptable interference protection only to radios that meet the standards described *supra*. We recognize that some users, particularly public safety agencies, may be using older radios that do not conform to the standards. Accordingly, we are specifying that 800 MHz licensees asserting an entitlement to interference protection, but which employ receivers that fail to satisfy the criteria above will be afforded interference protection only at higher power levels than -104 dBm (for mobiles), -101 dBm for portables.³²⁹ For example, if a radio meeting the above criteria provided a 20 dB C/(I+N) ratio when presented with a -104 dBm signal, but a non-compliant radio delivered only a 15 dB C/(I+N) ratio when presented with a -104 dBm signal in the same environment, then the interference entitlement for the licensee using the non-compliant radio will be based on receipt of a -99 dBm measured signal power instead of -104 dBm. The net result would be that the licensee with the non-compliant radio would have less interference protection because, to claim entitlement to protection, the licensee would have to show that, in the area in which interference was encountered, the licensee's system would have to provide a 5 dB higher received power level, *i.e.* -104 dBm - (-99 dBm) = 5 dB.

113. Finally, we note Motorola's announcement of prototype receivers with switchable attenuators.³³⁰ In brief, the Motorola prototype senses the signal strength of the incoming desired signal and determines when the signal is sufficiently strong that it can tolerate a given amount of attenuation, *e.g.* 10 dB, without compromising the intelligibility of the incoming communication.³³¹ At that point, attenuation is automatically introduced between the radio's antenna and the first active device in the input chain (the "R.F. preamplifier" or "low noise amplifier") of the receiver.³³² With the signal so attenuated, a significant improvement is realized in the effective intermodulation rejection ratio of the receiver.³³³ Although the information submitted to date is encouraging, it is inconclusive as to the degree of overall interference protection the use of such receivers would provide in a typical system. The attenuator circuitry does not address OOB interference and is able to abate intermodulation interference only in

³²⁶ See TIA- TSB102.CAAA at 2.1.9.2 and TIA/EIA-603-A at 2.1.9.2.

³²⁷ See Motorola November 3 *Ex Parte* at 4-5.

³²⁸ We also note that, in some important respects, there is no difference between Class A and B receiver specifications. For example, the recommended delivered audio quality ("DAQ") for both is 3.4, and that DAQ requires a ratio of C/(I+N) of approximately 20 dB for analog receivers and 17.7 dB for digital receivers. See Table A-1, Annex A of TSB-88A.

³²⁹ See Supplemental Comments of the Consensus Parties, Appendix F at F-8, § 4.1.1b.

³³⁰ See Motorola May 6 *Ex Parte*.

³³¹ *Id.* at 5.

³³² *Id.*

³³³ *Id.* at 7, Figure 1.

areas in which the desired signal is strong enough to activate the attenuator.

114. Motorola stated that it could incorporate switchable attenuators in new products without a significant cost penalty; that it could retrofit switchable attenuators in certain of its earlier radios; and that the attenuation circuitry is not proprietary.³³⁴ However, it has not provided diagrams of the circuitry and no other manufacturer has come forward to endorse use of such radios, much less commit to producing them. Nonetheless, we believe that the potential for improved intermodulation interference rejection through use of switchable attenuators is sufficiently promising that we will continue to monitor manufacturers' development of radios with improved intermodulation rejection ratio—whether by use of switchable attenuators or otherwise—and, if the facts so indicate, will consider reviewing our rules governing intermodulation rejection standards for 800 MHz public safety receivers. We note the statement by Motorola that more interference resistant receivers can be produced at little or no additional cost.³³⁵ With respect to these receivers and other 800 MHz public safety equipment, we strongly encourage the industry as a whole not to seek excessive profits when offering suitable equipment to public safety agencies. In so doing, equipment manufacturers can make a significant contribution to providing first responders with the affordable communications equipment necessary to meet their Homeland Security obligations.

3. Overall Approach to Interference Abatement

a. Role of Enhanced Best Practices

115. As an initial matter, we recognize that some unacceptable interference can originate from multiple sources, e.g., two or more cells, (ESMR, cellular telephone, or both) each contributing to OOB or intermodulation interference. In such cases, all involved ESMR and/or cellular telephone licensees are jointly and severally responsible for abating the interference, no matter how small their contribution to the problem. In this regard, we believe that adopting rules and policies expressly imposing such responsibilities on such licensees operating in the 800 MHz spectrum is consistent with the mandate in Section 1 of the Act to enhance the safety of life and property.³³⁶ In addition, we emphasize that a reactive approach to interference abatement is per se undesirable because of the concomitant adverse impact on public safety, CII and other 800 MHz communications. Thus, we encourage all 800 MHz licensees, in designing new systems or modifying existing systems, to anticipate and avoid potential interference before it occurs. This encouragement extends to designers of non-cellular 800 MHz systems as well; inasmuch as providing a more robust desired signal contributes significantly to interference abatement. To facilitate system designs that take the relevant interference environment into account, we are adopting rules that require mutual prior notification, on request, of changes or additions to ESMR, cellular telephone, public

³³⁴ See Letter, dated June 20, 2003, from Steve B. Sharkey, Director, Spectrum and Standards Strategy, Motorola, Inc. to James Schlichting, Deputy Chief, Office of Engineering and Technology, Federal Communications Commission at 7-8 (Motorola June 20 *Ex Parte*).

³³⁵ *Id.*

³³⁶ 47 U.S.C § 151. See also 4.9 GHz Band Transferred from Federal Government Use, WT Docket No. 00-32, *Memorandum Opinion and Order and Third Report and Order*, 18 FCC Rcd 9152 (2003) (allocating spectrum for public safety in furtherance of Commission's Section 1 obligation to promote safety of life and property); E911 Accuracy Standards Imposed on TIER III Carriers for Locating Wireless Subscribers Under Rule Section 20.18(H), WT Docket No. 02-377, *Order*, FCC 03-297 (2003) (denying a petition for forbearance from certain E911 requirements because of the strong connection between such requirements and the Commission's obligation to promote safety of life).

safety and CII 800 MHz systems;³³⁷ and are encouraging other voluntary and cooperative interference abatement solutions, such as “channel swaps.”

116. As noted earlier, the majority of the comments in this proceeding support abating harmful interference to public safety systems operating in the 800 MHz band by one of two methods: relying exclusively on Best Practices³³⁸ or by reconfiguring the 800 MHz band. Following publication of the *Best Practices Guide* in 2000, and throughout this proceeding, the Commission has given careful thought to whether Enhanced Best Practices, alone, would suffice to reduce unacceptable interference to the extent necessary to provide reliable 800 MHz public safety communications. In particular, we have carefully analyzed the filings by the Balanced Approach parties which urge adoption of a rule that would essentially codify many of the *Best Practice Guide* remedies and which would contain additional requirements—primarily procedural—to be followed when interference is encountered.³³⁹

117. We recognize that the development of the technical measures described in the *Best Practices Guide*, and subsequent related documents such as the Motorola *Technical Toolbox* represent an enormous amount of work and an almost unprecedented level of cooperation within the 800 MHz user community. We commend both the effort involved in developing these measures and the cooperative spirit they represent. We encourage continued research into interference abatement measures so that Enhanced Best Practices can become even more effective as a tool for remedying unacceptable interference. In so saying, however, we note that the voluntary use of Best Practices to date has abated many, but by no means all, instances of interference to public safety communications.

118. Voluntary Best Practices have often proven effective in abating interference on a case-by-case basis and will continue to be valuable—in the form of Enhanced Best Practices—even after band reconfiguration. Although there are several interference abatement strategies subsumed under the Enhanced Best Practices rubric, they fall into three basic categories: (1) changing the technical parameters of ESMR and/or cellular cell sites; (2) improving the equipment, including portable and mobile units, of the licensee encountering interference; and (3) establishing interference abatement procedures such as, prior notification of cell activation or modification. Details on these three categories of Enhanced Best Practices and the advantages and disadvantages thereof are contained in Appendix D *infra*. Enhanced Best Practices procedures formalize the cooperative efforts that some ESMR and cellular telephone licensees have undertaken to promptly identify and abate unacceptable interference. In furtherance of such efforts we are adopting rules today that require 800 MHz licensees to share technical data on request,³⁴⁰ and that set specific schedules for the identification, notification, assessment and abatement of unacceptable interference.³⁴¹

119. We note, however, that, as with almost any engineering solution, there are technical tradeoffs associated with most Enhanced Best Practices. For example, abating unacceptable interference using Enhanced Best Practices can sometimes be done only at the expense of affecting the coverage and

³³⁷ See ¶¶ 124-127 *infra*.

³³⁸ “Best Practices” as used herein refers to the recommendations for voluntary interference abatement contained in the *Best Practices Guide*. See n. 40 *supra*.

³³⁹ See, e.g., Letter, dated May 29, 2003, from Jill Lyon, Esq., Vice President and General Counsel, UTC to Marlene H. Dortch, Secretary, Federal Communications Commission.

³⁴⁰ See ¶ 124 *infra*.

³⁴¹ See ¶¶ 132-141 *infra*.

subscriber capacity of ESMR and cellular systems, e.g., Enhanced Best Practices that rely on restricting ESMR or cellular channel use or making significant reductions in cell ERP. Proposals advancing the use of Enhanced Best Practices—however defined—as the sole remedy for interference abatement have a significant drawback that makes them problematic as a long-term solution: they incur high transactional costs for all parties and would have to continuously be applied to an increasing number of interference incidents that are inevitable as use of the 800 MHz band intensifies.³⁴² Several parties also note that most of the remedies described in the *Best Practices Guide* are fundamentally reactive because interference must first be encountered before abatement efforts commence.³⁴³ We regard this as another serious drawback. It would be scant consolation for a public safety officer subjected to a life-threatening communications failure to know that he or she could report the problem so that technical fixes could eventually be applied to fix it—or not.

120. The record supports our conclusions about the high transactional costs of employing case-by-case remedies alone to abate harmful interference to public safety systems in the 800 MHz band. Nextel, one of the few parties that submitted comments detailing the costs of implementing Best Practices techniques, asserts that it employs between ten to fifteen full-time employees devoted to coordinating the company's interference abatement measures nationwide and employs over twenty additional technicians to resolve each interference problem.³⁴⁴ Nextel further asserts that it spends at least \$10,000 investigating and temporarily mitigating interference at a single site and that this cost can increase by as much as \$25,000 if additional equipment is required.³⁴⁵ Moreover, according to Nextel, implementing these measures can take from six to ten weeks with no guarantee that the particular technique being implemented will cure the interference problem.³⁴⁶ We further note that the record shows that it is not only CMRS licensees that incur interference mitigation costs. For example, both Anne Arundel County and Denver state that they have spent significant amounts of money and employee time attempting to mitigate interference on a case-by-case basis.³⁴⁷

121. Against this backdrop, we are concerned that the inevitable increase in the number of potential and actual interference situations that will arise, in the 800 MHz band, as currently configured, could strain the effectiveness of the mitigation techniques and increase their cost, possibly rendering interference abatement ineffective and unaffordable. Thus, while we do not question the short-term efficacy of Enhanced Best Practices, we conclude that licensees in the 800 MHz band would be better served by a long-term solution that minimizes this burden. Indeed, in the 700 MHz Guard Band proceeding, the Commission recognized early on the necessity of spectrally separating incompatible

³⁴² This is due to the increased use of this band by public safety licensees as well as the increased use necessitated by the expanding subscribership of ESMR and cellular systems.

³⁴³ See Comments of APCO at 9-10; IACP *et. al.* Comments 4-5; Nextel Reply Comments at 58; Reply Comments of Consensus Parties to Supplemental Comments of Consensus Parties at 13.

³⁴⁴ See Letter, dated December 19, 2003, from Regina M. Keeny, Counsel to Nextel to Michael J. Wilhelm, Esq., Federal Communications Commission at 12.

³⁴⁵ *Id.* at 10-11.

³⁴⁶ *Id.* at 10.

³⁴⁷ *Id.* at 12. Denver contends that it has spent in excess of \$130,000 to mitigate interference and Anne Arundel County estimates these costs to be “hundreds of thousands of dollars.” See Letter, dated November 3, 2003 from Alan Tilles, Esq., Counsel to the City and County of Denver to John Muleta, Esq., Chief, Wireless Telecommunications Bureau, Federal Communications Commission. See also Application for Review in WT Docket 02-100, filed August 6, 2003, by Anne Arundel County at 6.

technologies in order to avoid the incidence of interference to non-cellular public safety from cellular operations.³⁴⁸ In drafting up its 700 MHz band plan, the Commission essentially recognized the significance of grouping technically compatible public safety systems in close spectrum proximity and that spectrally separating incompatible systems such as through the use of guard bands required direct regulatory intervention. The Commission further adopted a package of technical rules and interference mitigation procedures to ensure that Guard Band operations would not cause interference to adjacent public safety operations. The Commission's experience in 700 MHz provides ample evidence that combining a forward looking band plan with a customized package of interference avoidance techniques can be successful. Further, the record in this proceeding supports that reconfiguration of the 800 MHz band, while expensive in the short-term, will, over time, minimize the transaction costs incurred by 800 MHz licensees by reducing reliance on Enhanced Best Practices.³⁴⁹ Thus, although Enhanced Best Practices must remain the remedy of first resort until band reconfiguration is complete—and will remain necessary for otherwise intransigent cases of unacceptable interference, their high transactional cost indicates that it would be unwise to rely on Enhanced Best Practices as the exclusive remedy for interference abatement over the long term.

122. Again we emphasize that Enhanced Best Practices remain powerful parts of the interference abatement arsenal. We agree with the Consensus Parties that all feasible remedies—including band reconfiguration and Enhanced Best Practices³⁵⁰—must be applied to the problem if our goal is to be reached. Therefore, we expect 800 MHz ESMR and cellular telephone licensees will continue to use Enhanced Best Practices to abate harmful interference until the completion of band reconfiguration. We do recognize that instances of residual harmful interference will crop up even after band reconfiguration but are confident that ESMR and cellular licensees can apply Enhanced Best Practices to resolve these cases. But, in our judgment, in the final analysis, the best long term solution requires a restructuring of the 800 MHz band to substantially reduce the need for case-by-case interference management.

123. In this connection, we recognize that some interference incidents may not be effectively addressed through use of Enhanced Best Practices. As a result some alternative redress may be needed prior to the completion of reconfiguration of the 800 MHz band. Given that channel swapping is essentially band reconfiguration on a micro scale, we anticipate looking favorably upon proposals mirroring the band plan set forth in this *Report and Order*. Conversely, we anticipate being less inclined to approve proposals that deviate from the band plan. We also delegate to the Chief of the Wireless Telecommunications Bureau the authority to grant whatever waivers are necessary to implement channel swap proposals.

b. Interference Abatement Rules and Procedures

(i) Mutual Notification Requirements Applicable to 800 MHz Licensees

124. We are adopting rules requiring ESMR and cellular telephone licensees to furnish to those

³⁴⁸ See ¶ 41 *supra*.

³⁴⁹ See Letter, dated May 16, 2003, from Robert Foosaner, Senior Vice President and Chief Regulatory Officer to Nextel Marlene Dortch, Secretary, Federal Communications Commission at 14-15; Sun Fire Group Study at 11-13; Denver SOW at 1-2; Letter, dated December 19, 2003, from Regina M. Keeny, Counsel to Nextel to Michael J. Wilhelm, Esq., Federal Communications Commission at 10-11.

³⁵⁰ See Supplemental Comments of the Consensus Parties at 39.

public safety and CII agencies who request it, prior notice of at least ten business days before new cells are constructed or existing cells are modified.³⁵¹ Public safety and CII agencies which receive this information have the reciprocal obligation to inform ESMR and cellular telephone licensees whenever the public safety or CII licensee changes its system parameters. We take these steps in general agreement with those parties who believe that prior notice has a prophylactic effect on interference avoidance. Thus, if the characteristics of a proposed new cell are known in advance, it is possible to analyze the cell's potential for interference and make any necessary revisions to cell parameters before the cell is activated. For example, an ESMR or cellular telephone licensee could furnish the public safety or CII licensee or its representative, e.g. a frequency coordinator, the proposed parameters of a new cell sufficiently far in advance to allow these parties to analyze the cell's potential for interference and suggest any necessary changes that should be made before the cell is activated. This exchange of information can be performed in any manner agreeable to all parties involved. We decide to limit this notification entitlement to only public safety and CII licensees; and then only if they request ESMR and cellular telephone licensees to furnish them the information on a regular basis. We decline the alternative—requiring ESMR and cellular licensees to furnish the information whether requested or not—in the interest of avoiding the burden of producing and receiving unnecessary paperwork, and in fulfillment of our obligations under the Paperwork Reduction Act.³⁵² We do not require notification of other non-cellular 800 MHz licensees in consideration of the fact that their communications are unlikely to be of a mission-critical nature and because of the burden that could be imposed on the ESMR and cellular telephone carriers were it necessary to furnish information to large numbers of licensees, especially in urban areas. However, we do endorse, but do not require, ESMR and cellular telephone licensees furnishing notification information to any 800 MHz licensee requesting it; e.g., because of frequent instances of interference. Finally, we impose a reciprocal obligation on public safety and CII licensees to provide notification of their facilities, and any modifications thereto, to ESMR and cellular telephone licensees requesting same.

125. The 800 MHz Users Coalition argues we should require prior coordination—rather than just notification—using the standards contained in TIA TSB-88A; but they have not stated precisely how TSB-88A would be useful in effecting prior coordination of cell sites.³⁵³ We note that TSB-88A was the result of studies of the impact of spectrum refarming and digital modulation on the frequency coordination of land mobile radio systems and deals primarily with potential co-channel and adjacent channel interference.³⁵⁴ However, in the case of 800 MHz public safety systems, co-channel interference has not been identified as a significant problem. Although adjacent channel interference can be a factor—particularly in the interleaved 800 MHz channels—the interference mechanisms at work in most instances of 800 MHz public safety systems differ from those covered in TSB-88A. Moreover, although TSB-88A makes a passing reference to “noise generated by non-wireline cell sites”³⁵⁵ in its discussion of

³⁵¹ We will not require ESMR or cellular telephone licensees to furnish prior notice information to non-public safety or non-CII licensees although we encourage the exchange of such information when specifically requested by a non-public safety or non-CII licensee.

³⁵² See Appendix B *infra*.

³⁵³ See 800 MHz Users Coalition May 29, 2003 *Ex Parte* at 6.

³⁵⁴ See TSB-88A, June 1999 at vii (Introduction). The TIA document does not contemplate interference from low site ESMR and cellular telephone systems of the kind discussed herein. For example, intermodulation interference is discussed only in the context of base station receivers, not mobile or portable receivers. See *id.* at § 5.4.2-5.4.4.

³⁵⁵ TSB-88A, June 1999 at 36 ¶ 5.1.

“Environmental RF Noise”³⁵⁶ the document is primarily directed to interference between high-site systems. Accordingly, although we believe that some parts of TSB-88A might be useful in 800 MHz interference analysis, *e.g.* the document’s discussion of coverage reliability;³⁵⁷ we do not think it wholly applicable to the environment in which 800 MHz public safety systems operate. We are aware of no agreed-upon coordination standards that address the OOBE and intermodulation interference that occurs in the immediate vicinity of cell sites; and thus are not mandating prior coordination of cell sites. However, we believe that notification of cell site parameters will allow some inferences to be drawn, on a case by case basis, relative to the cell’s potential for generating unacceptable interference.

126. The parameters most relevant to prior notification of a cell are its location, the effective radiated power, the antenna height, and the channels in use.³⁵⁸ Accordingly, we believe that non-cellular 800 MHz licensees should have such information available on request from ESMR and cellular telephone licensees and so require. We impose a similar requirement on public safety licensees (*i.e.*, to, upon request, provide their operating parameters to ESMR and cellular telephone licensees operating within the public safety systems’ coverage areas.). We are aware that some ESMR and cellular telephone licensees regard their operating parameters as proprietary and encourage such licensees to use non-disclosure agreement whereby third parties will not be given access to such information. Failing that, the affected parties may seek a protective order from the Commission.³⁵⁹ We also encourage, but do not require, that the matter be submitted to arbitration, mediation, or other alternative dispute resolution mechanism.

127. We stress that the prior notification provided to the public safety licensee is for informational purposes only: we are not affording public safety or CII licensees the right to accept or reject the activation of a proposed cell or to unilaterally require changes in its operating parameters. The principal purposes of notification are to: (a) allow a public safety or CII licensee to advise the ESMR or cellular telephone licensee whether it believes a proposed cell will generate unacceptable interference; (b) permit ESMR or cellular telephone licensees to make voluntary changes in cell parameters when a public safety or CII licensee alerts them to possible interference; and (c) rapidly identify the source if interference is encountered when the cell is activated. Thus, at the very least, the knowledge that a new ESMR or cellular telephone cell was going to be activated on a given date would allow a public safety or CII representative to attribute interference to that cell if new interference were encountered where it had not existed before.

(ii) Responsibility for Mitigation Pre- and Post- Band Reconfiguration

128. The Consensus Parties envisioned that their unacceptable interference threshold provisions would go into effect only after band reconfiguration was complete. However, the severity of interference currently being encountered is such that we cannot responsibly let it go unaddressed in the interim. Given the demonstrated utility of Enhanced Best Practices, and the extensive other resources—technical, financial and otherwise—available to ESMR and cellular licensees, they currently are capable of eliminating unacceptable interference pending completion of band reconfiguration, albeit at the

³⁵⁶ *Id.*

³⁵⁷ *Id.* at 86.

³⁵⁸ *See, e.g.*, Project 39, Interference to Public Safety 800 MHz Radio Systems, *Interim Report to the FCC*, December 24, 2001 at 12-21. *See also Best Practices Guide* at 7-8; Motorola Comments at 20.

³⁵⁹ *See* Digital Output Protection Technology and Recording Method Certifications, *Order*, MM Docket 04-68, DA 04-716 (rel. Mar 17, 2004). *See also* 47 C.F.R §§ 0.457, 0.459.

occasional expense of subscriber capacity limitations or the need to fund improvements to non-cellular systems. Although many ESMR and cellular licensees have been commendably cooperative in bearing the responsibility for identifying and promptly curing interference at their own expense; we believe it prudent to codify this previously voluntary effort into strict responsibility. Under that policy, any ESMR or cellular telephone licensee that causes, or contributes to, unacceptable interference to a non-cellular licensee is responsible for abating it promptly at its own expense. In so assigning responsibility, we place it on the party or parties best qualified and situated to take the actions necessary to ensure that first responders—both public safety and CII personnel—have communications channels free of unacceptable interference and which thus are suitable for mission-critical operations including rapid response to major attacks that threaten Homeland Security. Accordingly, as of the effective date of this *Report & Order*, ESMR and cellular carriers are strictly responsible for abating unacceptable interference as defined *supra*.³⁶⁰

129. We carefully considered alternatives to strict responsibility, including those discussed in the *NPRM* but found them either insufficiently effective or overly burdensome on the ESMR and cellular telephone industries. For example, we considered the comments of parties which advocated across-the-board limits on such cell parameters as maximum power flux density in the immediate vicinity of the cell, reduced effective radiated power, antenna vertical pattern restrictions, limits on the cumulative OOB from cell transmitters and the like.³⁶¹ However, we recognized that such limits would impose heavy burdens on ESMR and cellular telephone licensees, and that the restrictions would require modifications of cells that had little, if any, potential for generating unacceptable interference. Therefore, in lieu of adopting what could be draconian rules, we are affording ESMR and cellular telephone licensees the discretion to make any necessary changes to their own systems—or changes to non-cellular systems affected by unacceptable interference—as may be necessary to eliminate unacceptable interference.³⁶²

130. We assign strict responsibility for eliminating unacceptable interference when an ESMR or cellular telephone signal is solely implicated in an interference incident. In circumstances in which two or more ESMR or cellular telephone signals are implicated, strict responsibility must be reflected in the sources' joint and several responsibility for interference abatement. We say this in the knowledge that the interfering licensees are in the best position to determine their relative contributions to interference problems and to agree upon what specific measures must be undertaken by each licensee in order for interference abatement efforts to be effective. We wish it understood, however, that such responsibility does not attach merely because a licensee's cell is in the immediate vicinity of the locus of interference. Thus, we will not assign joint and several responsibility to ESMR and cellular telephone licensees that can demonstrate that their signals are not involved in a given interference case.³⁶³ However, in so saying, we emphasize that we have discounted claims, made earlier in this proceeding, categorically denying that

³⁶⁰ In imposing strict responsibility for the abatement of unacceptable interference we are doing no more than formalizing the interference-abatement responsibilities underlying the Commission's initial approval of cellular-architecture systems operating in the 800 MHz band. See *Fleet Call, Inc., Waiver Request* at 32-33. There the Commission noted that *Fleet Call's* statement about interference potential "firmly guides our consideration of *Fleet Call's* proposal." *Id.*

³⁶¹ See n. 305 and n. 306 *supra*.

³⁶² We decline to specify what remedies may be necessary in a particular circumstance, but observe that they could include responsibility for furnishing affected non-cellular systems with additional base stations or more interference-resistant mobile and portable radios.

³⁶³ See 47 C.F.R. §§ 22.971(b)(2) and 90.673(b)(2) in Appendix C *infra*.

licensees in the cellular telephone bands cause interference to 800 MHz public safety systems.³⁶⁴ There is strong evidence to the contrary.³⁶⁵ We will, therefore, require all involved parties, ESMR and cellular telephone licensees alike—and each of them severally—to respond to every complaint of interference to a non-cellular 800 MHz system with full cooperation and utmost diligence to abate objectionable interference in the shortest practicable time.

131. In sum, rather than impose stringent, across-the-board emission limits at this time, we are adopting rules that require ESMR and cellular telephone licensees to act only when and where it is evident that unacceptable interference is or will be caused to non-cellular 800 MHz systems, thereby affording such licensees a high degree of technical flexibility and minimizing the cost of interference avoidance.³⁶⁶

However, we will not extend the same level of flexibility to the procedures, and associated time limits, necessary to ensure that ESMR and cellular telephone licensees respond to complaints of interference to public safety/CII systems. Although some ESMR and cellular telephone licensees have been commendably cooperative in abating interference; the record shows that this has not always been the case.³⁶⁷ Thus, we assign ESMR and cellular telephone licensees strict responsibility for effectively curing actual or potential unacceptable interference to 800 MHz public safety/CII systems in the shortest practicable time.³⁶⁸ To a degree, this approach will test the wisdom of our forbearing system-wide stringent regulation of the technical aspects of ESMR and cellular telephone systems pending an assessment of whether licensees can successfully abate interference under the less stringent regulatory regime we establish today.

(iii) Interference Resolution Procedures

132. We agree with those commenting parties that urged adoption of standardized procedures for reporting 800 MHz interference, identifying its source and implementing a solution.³⁶⁹ We believe the effectiveness of such procedures is optimized if they are associated with specific compliance deadlines and the industry's use of a common method of disseminating interference complaint information and related communications.

³⁶⁴ See, e.g., Verizon Comments at 2; Southern LINC Comments at 11; and Cingular Comments at 2-3. Some parties argued that reports of interference were anecdotal in nature, and for that reason, did not represent a true evaluation of the problem. See Cinergy Comments at 7-9.

³⁶⁵ See, e.g., Anne Arundel County *ex parte* letter dated July 29, 2003 at 2 (indicating that, in addition to Nextel, both Cingular and Verizon contribute to interference). See also Denver June 10 *Ex Parte* at 1 (stating that field measurements and analysis implicate AT&T Wireless as a source of interference).

³⁶⁶ See 47 C.F.R. §§ 22.972 and 90.674 in Appendix C *infra*.

³⁶⁷ See e.g., City of Portland, Oregon Comments at 3 (describing difficulty in securing Nextel's cooperation in resolving interference); Department of Information Technology, Fairfax County, Virginia Comments (indicating that Nextel causes interference but has implemented no mitigation measures); Attachment to Letter, dated September 17, 2003, from Alan H. Tilles, Counsel for City and County of Denver to Marlene H. Dortch, Secretary, Federal Communications Commission at 4 (stating that AT&T has taken no steps to mitigate ongoing interference).

³⁶⁸ See 47 C.F.R. §§ 22.972(c) and 90.674(c) in Appendix C *infra*.

³⁶⁹ See, e.g., Supplemental Comments of the Consensus Parties, Appendix F at F-5-6; Comments of Alltel, *et al.* to Supplemental Comments of the Consensus Parties, Appendix A at A-2-3; Comments of Consumers Energy to Supplemental Comments of the Consensus Parties, Appendix A at A-2-3; McDermott, Will and Emery *ex parte* presentation dated March 12, 2003, (McDermott, Will and Emery March 12 *Ex Parte*), Appendix A at A-2-3; 800 MHz User Coalition May 29 *Ex Parte*, Appendix A.

133. *Initial Notification.* We will require licensees operating cellular-architecture systems in or adjacent to the 800 MHz band (ESMR, Cellular A Band and Cellular B Band) to establish, within thirty days of the effective date of this *Report and Order*, a common electronic means of receiving initial notification of interference complaints from non-cellular 800 MHz licensees. Although we do not specify the means to be used, we do require that it be a single, common point (for example, a single, nationwide email address or web page) so that an affected entity need not provide multiple notices to different ESMR or cellular telephone licensees.³⁷⁰ We concur with the commenting parties who believe that, at a minimum, the initial interference complaint should include:

- the specific geographical location where the interference occurs, and the time or times at which the interference occurred or is occurring;
- a description of the scope and severity of the interference;
- the source of the interference if known;
- the relevant FCC licensing information of the party suffering the interference; and
- a single point of contact for the party suffering the interference.³⁷¹

134. The notification system shall be established on a strict “need-to-know” basis: the general public will not be able to access the system; only parties to a given interference complaint will have access to information concerning that complaint; and parties using the system will be required to agree to non-disclosure provisions. The Commission’s Enforcement Bureau, however, will have unrestricted access to all information in the system and will not be bound by any non-disclosure provisions.

135. The Consensus Parties, in their proposed “Policies and Procedures for Post-Realignment Interference Mitigation,”³⁷² recommended that we require any ESMR or cellular telephone licensee within a 5,000 foot radius of an interference site to respond to an interference complaint within a maximum of two days. Other parties recommended similar distances and response times.³⁷³ We believe the 5,000 foot radius is reasonable for purposes of identifying those parties that must respond to an interference complaint,³⁷⁴ but note that we will not absolve parties with cell sites outside that radius from the responsibility for eliminating unacceptable interference if it is demonstrated that they are the source

³⁷⁰ We note that Nextel currently has such a mechanism in place. Parties claiming that Nextel systems are causing interference to their systems can email public_safety@Nextel.com. See Attachment to Nextel October 22, 2003 *Ex Parte* at 3.

³⁷¹ See Comments of Cinergy to Supplemental Comments of Consensus Parties, Appendix A at A-2-3; Comments of Consumers Energy to Supplemental Comments of Consensus Parties, Appendix A at A-2-3; 800 MHz Users Coalition June 11, 2003 *Ex Parte* at 4.

³⁷² See Supplemental Comments of the Consensus Parties at Appendix F.

³⁷³ *Id.* at F 5-6; Comments of Alltel, *et. al* to Supplemental Comments of the Consensus Parties, Appendix A at A-2; McDermott, Will and Emery March 12 *Ex Parte*, Appendix A at A-2, item B.2; 800 MHz User Coalition May 29 *Ex Parte*, Appendix A at 5.

³⁷⁴ See *e.g.*, Motorola *ex parte* presentation dated October 30, 2002 (Using data taken in the Chicago area, Motorola demonstrates that—beyond 5,000 feet—the signal strength from ESMR base stations would be insufficient to cause intermodulation interference to a radio with 70 dB intermodulation rejection ninety-percent of the time).

thereof.

136. We are less sanguine about the recommendation that a response to an interference complaint could be delayed for up to two days.³⁷⁵ An unresolved incident of unacceptable interference impairs the ability of the affected public safety or CII licensee to respond to an emergency, large or small. Given the ease of communicating interference complaints electronically, and the fact that many, if not most, ESMR and cellular telephone licensees have technical staff available or on call on an around-the-clock basis in the normal course of business, we believe that a response must come in a matter of hours, not days. We thus conclude that it is not unduly burdensome to require a response to complaints from public safety or CII licensees with all possible speed, and under no circumstances, in more than twenty-four hours. In the case of other non-cellular 800 MHz licensees, (*i.e.*, B/ILT and non-cellular SMR licensees), the maximum response time shall be forty-eight hours, acknowledging that, for the most part, communications on these latter systems are not safety-related.

137. *Interference Analysis.* We will require licensees receiving an initial notification of interference to perform a timely analysis and identification of the interference, including, whenever necessary, an immediate on-site visit if they have cellular architecture equipment operating within 5,000 feet of the interference incident. Licensees must complete this analysis and initiate corrective action within forty-eight hours of the initial complaint if the licensee is a public safety or CII licensee. In the case of other non-cellular 800 MHz licensees, the time to complete the analysis and initiate corrective action shall be ninety-six hours. In both cases the time period may be extended if the affected licensee reasonably agrees, in writing (including e-mail or other electronic means which creates a record), to a longer period.

138. We disagree with those parties that suggest that the analysis or on-site visit could safely be delayed for up to five working days of the date of the original complaint.³⁷⁶ We assume that an ESMR or cellular telephone operator would not allow a failure in a critical element of its network to remain uncorrected for five working days, and thus believe that forty-eight hours (ninety-six hours in the case of other than public safety and CII systems) is a generous allowance for ESMR or cellular telephone carriers to determine (including making any necessary site visits), whether their operations are interfering with public safety, CII or other 800 MHz communications. In focusing on the obligations of ESMR and cellular telephone licensees we do not mean to imply that similar obligations do not attach to public safety, CII and other non-cellular 800 MHz licensees. They are bound by the good-faith obligation to exhibit the utmost cooperation with the ESMR and cellular telephone representatives, including, without limitation, the obligation to timely meet appointments and provide whatever technical assistance is appropriate under the circumstances.

139. *Mitigation Steps.* Although we leave the means whereby interference is abated to the discretion of the involved ESMR and cellular telephone licensees, we couple this discretion with an obligation on such licensees to provide all test equipment (and technical personnel skilled in the operation of such equipment) necessary to determine the most appropriate means of timely eliminating the interference. The record contains considerable guidance concerning techniques that parties can apply to the problem, including those described in the *Best Practices Guide*, the separately issued Motorola

³⁷⁵ See *e.g.*, Supplemental Comments of the Consensus Parties at Appendix F, § 3.2; 800 MHz User Coalition June 11, 2003 *Ex Parte* at 5.

³⁷⁶ See Supplemental Comments of the Consensus Parties at Appendix F at F 6; Comments of Alltel, *et al.* to Supplemental Comments of the Consensus Parties, Appendix A at A-3; McDermott, Will and Emery March 12 *Ex Parte*, Appendix A at A-3, item 3; 800 MHz User Coalition May 29 *Ex Parte* presentation, Appendix A at 5.

Technical Appendix thereto,³⁷⁷ and the recently described measurement protocol for ascertaining the exact interference mechanisms involved in a given complaint.³⁷⁸ We expect parties to resolve interference in the shortest practicable time; however, should all short-term measures prove inadequate, we recognize that parties sometime cannot readily or rapidly implement other remedial measures—for example, “channel swaps” or the installation of new or modified base stations.³⁷⁹ In such cases, we believe a rule of reason should apply and that the licensee affected by interference, while not compromising safety, should make all necessary concessions to accepting the interference until the implementation of longer-term remedies.³⁸⁰ However, we will consider the failure to timely implement an interference abating remedy—whether it be near term or long term—as evidence of bad faith and will deal with it accordingly.

140. We also provide public safety licensees a “safety valve” for use when the continued presence of interference constitutes a clear and imminent danger to life or property.³⁸¹ Under such circumstances, we will require the interference source(s) to immediately discontinue operation, pending the identification and application of corrective measures. The request for this action: (a) must be made by affidavit or statement under penalty of perjury,³⁸² from an officer or executive of the affected public safety licensee; (b) shall completely describe the basis of the claim of clear and imminent danger; (c) must be stated to be on personal knowledge or on belief after due diligence; (d) may not be made by a contractor or other third party; and (e) will not be effective until approved by an official of the Commission’s Wireless Telecommunications Bureau or other authorized Commission official. The public safety party must serve the statement on the ESMR and/or cellular telephone licensee by hand-delivery or receipted fax and transmit a copy by fastest available means to the Washington, D.C., office of the Wireless Telecommunications Bureau.³⁸³ If the Wireless Telecommunications Bureau determines that the claim of imminent and present danger is valid, it will immediately refer the matter to the Enforcement Bureau for

³⁷⁷ See generally Appendix D *infra*.

³⁷⁸ See Motorola April 11, 2003, *ex parte* presentation to Federal Communications Commission Office of Engineering and Technology at 15-17.

³⁷⁹ In cases in which intractable interference problems have not yielded to other technical remedies, Nextel and public safety licensees have entered into agreements for “channel swaps,” whereby Nextel moves its 800 MHz ESMR operations to the public safety licensees’ channels and the public safety licensee relocates its operations to Nextel’s ESMR frequencies. Under these agreements, Nextel would pay all or most of the expense associated with equipment retuning or replacement. The Commission has granted several applications implementing channel swaps in Anne Arundel County, Maryland. See, e.g., Application for Modification of License of Station KNJU756, File No. 476003. The Commission is also reviewing another such agreements between Nextel and the City of Denver. We also have been informed that the city and county of San Diego, California are considering similar agreements. See generally, Denver SOW and San Diego *Ex Parte*. As yet, insufficient information exists on the results of channel swaps to allow us to assess their efficacy. However, we believe that the swaps will provide a test bed for band reconfiguration, to the extent they yield valuable information on process; *i.e.*, the time required to negotiate the agreements; the determination and apportionment of costs and responsibilities, the time required to make the necessary technical changes, and the disruption, if any, of public safety services.

³⁸⁰ Should disputes arise in connection with such matters, parties are encouraged to resolve them using arbitration, mediation or other alternative dispute mechanisms.

³⁸¹ We stress that we only provide this “safety valve” to public safety licensees.

³⁸² See 47 C.F.R. § 1.16.

³⁸³ The Washington, D.C. office of the Wireless Telecommunication Bureau is: 445 12th Street SW, Washington, D.C. 20554. Complaints should be addressed to the Public Safety and Critical Infrastructure Division.

appropriate action. Any party alleging intentional or negligent misrepresentation or omission in such an affidavit or statement made under penalty of perjury may submit documentation thereof to the Commission's Enforcement Bureau; whereupon the Enforcement Bureau may institute an enforcement action which could result in, without limitation, forfeitures and license revocation. Such Commission action would be in addition to, and not to the exclusion of, other remedies available under local, state or federal law.

141. Finally, we note that we will monitor interference complaint data on an ongoing basis to ensure the interference abatement objectives addressed in this proceeding will continue to be accomplished both before and after band reconfiguration. We emphasize that our responsibility to ensure that 800 MHz non-cellular licensees do not suffer from unacceptable interference from CMRS carriers will be complaint-driven, and we urge affected licensees to carefully monitor their systems and promptly report any incidents of unacceptable interference to the relevant CMRS carrier(s).³⁸⁴ To the extent that our experience reveals that the interference abatement procedures we adopt today require refinement to ensure high-quality 800 MHz public safety or CII service, we will do so as necessary.

C. Band Reconfiguration

142. As noted in the Introduction to this *Report & Order*, the root of the instant problem lies in fundamentally incompatible mix of two types of communications systems in the 800 MHz band: cellular-architecture multi-cell systems—used by cellular telephone and ESMR licensees—and high site systems—used by public safety, private wireless and non-cellular SMR licensees. For the reasons discussed below,³⁸⁵ we believe reconfiguring the 800 MHz band to separate these incompatible technologies, supplemented, when necessary with, Enhanced Best Practices provides the best long-term solution to the problem of interference in the 800 MHz band.³⁸⁶

1. Technical Issues Addressed by Band Reconfiguration

143. Segregating ESMR systems from non-cellular systems by placing them in opposite segments of the 800 MHz band will make it possible for ESMR and cellular telephone licensees to avoid some intermodulation interference. However, in some instances, consolidating ESMR channels into a single band segment may not—in and of itself—sufficiently reduce unacceptable intermodulation interference. The Radio Frequency (R.F.) carriers of systems in a consolidated ESMR band segment (and at least a portion of the R.F. carriers in cellular telephone systems), would still fall within the passband of all current public safety portable and mobile receivers. Thus, even in a reconfigured 800 MHz band, ESMR channels, or ESMR and cellular telephone channels could still, when combined in the receiver, generate intermodulation products. Therefore, as we discuss below, we believe that abatement of unacceptable intermodulation interference will require more than segregating cellular architecture systems from non-cellular systems.³⁸⁷ Thus, for example, ESMR licensees will have to make careful choice of channel selection such that two or more channels at a cell do not produce an intermodulation product falling on a public safety or CII channel.

³⁸⁴ We recommend, but do not require, that the affected parties keep records of interference complaints and the resolution thereof; and make such records available to the Commission on request.

³⁸⁵ See ¶¶ 143-146 *infra*.

³⁸⁶ We take these steps pursuant to our authority under Sections 316, 303, 301 and 154(i) of the Act. See ¶¶ 62-87 *supra* for our legal authority to address this issue.

³⁸⁷ See ¶ 144 *infra*.

144. Consolidating ESMR systems into one continuous segment in the upper portion of the 800 MHz band will provide ESMR licensees with greater flexibility in selecting channel pairs. The spacing between ESMR channels determines where intermodulation products will fall in the band. With closely spaced ESMR channels, the intermodulation products fall into—or just below—the upper portion of the ESMR segment of the reconfigured band. As the cell channel spacing increases, the intermodulation products become further removed from the ESMR band segment, extending further down into the non-cellular channels—including channels used by public safety systems. In the reconfigured band, a careful ESMR channel choice could reduce the potential for intermodulation interference generated between the ESMR channels in a given cell. Given careful coordination among licensees, it will also be possible, in some instances, to avoid intermodulation products formed by a combination of ESMR channels and cellular telephone channels. However, considerably more care is required when two licensees are involved. Close-spacing of channels is often not an option in that circumstance;³⁸⁸ however, it still may be possible to avoid channel combinations that result in intermodulation products falling on specific frequencies used by public safety/CII systems. This latter solution may be more difficult to implement when cellular telephone systems use dynamic channel allocation whereby the channels in a given cell can change frequently, e.g., on an hourly basis, in response to traffic loads. Moreover, some cellular telephone systems may make more use of technology, such as CDMA, in which wider bandwidth carriers produce IM products with a wider bandwidth thus potentially affecting more frequencies.

145. We believe that a reconfigured 800 MHz band will permit future public safety radios to be more interference resistant. Because there currently are public safety channels scattered throughout the 800 MHz band, from the bottom of the General Category band segment at 806 MHz/851 MHz to the top of the NPSPAC channels at 824 MHz/869 MHz, the device called, variously, the “preselector” or “input filter” of the public safety radio must be sufficiently wide to cover the complete 851-869 MHz range, including the current ESMR channels which fall at 861-866 MHz. Narrowing the range of Public Safety frequencies allows equipment manufacturers to utilize narrower filters that will attenuate potentially interfering signals higher in the band.³⁸⁹

146. In sum, while band reconfiguration, in conjunction with careful engineering of cell sites, will reduce intermodulation interference between ESMR channels *inter sese*, it is apparent that particular care will have to be exercised when both ESMR and cellular telephone channels are implicated. In the long term, however, band reconfiguration will result in a net reduction in both unacceptable OOB and intermodulation interference for the following reasons:

- Nextel will completely relinquish rights to all of the interleaved channels, relieving OOB interference to licensees operating non-cellular systems on the interleaved portion of the band.³⁹⁰

³⁸⁸ For example, the Consensus Parties propose relocating all ESMR channels to the 862-869 MHz band segment while all cellular telephone channels would remain in the adjacent 869-894 MHz band segment. Thus ESMR and cellular telephone channels could be closely spaced only in the upper portion of the ESMR band segment, which corresponds to the lower portion of the cellular telephone band segment.

³⁸⁹ In a sense, the preselector or input filter is the “front door” of the radio which currently must be open wide enough that potentially interfering ESMR signals can enter unimpeded. However, when the 800 MHz band is reconfigured, the “front door” need be opened only widely enough to admit signals from 851-862 MHz. With the door not open as wide, signals above 862 MHz—including ESMR and cellular telephone signals—would have a difficult time squeezing through and causing interference.

³⁹⁰ See Supplemental Comments of the Consensus Parties at 14.

- Nextel will relocate its systems operating on General Category channels to the upper portion of the 800 MHz band, therefore relieving OOB interference that these systems currently can cause to non-cellular systems operating on channels immediately above the General Category channels.³⁹¹
- Reconfiguring the 800 MHz band to separate cellular systems from non-cellular systems will substantially reduce interference to public safety created by OOB by allowing ESMR licensees to replace current base station transmitter duplexers with new duplexers that will "roll-off" RF energy immediately below 862 MHz.³⁹²
- Consolidation of Nextel channels in the upper portion of the band will give ESMR operators and cellular telephone licensees greater flexibility to make a judicious choice of channel selection and channel spacing, thereby either confining potential ESMR intermodulation interference to a smaller portion of the non-cellular segment of the band, or limiting intermodulation products that fall on given CII or public safety channels.³⁹³
- We anticipate that, after band reconfiguration, equipment manufacturers will design public safety radios to cover only the portion of the 800 MHz band below 817/862 MHz because no public safety system will be operating in the ESMR spectrum above 817 MHz/862 MHz.³⁹⁴ Thus, with public safety radios no longer required to cover the entire 800 MHz band, the first R.F. amplifier ("preselector") of the public safety radio can be designed to attenuate the potentially interfering ESMR and cellular telephone signals originating from systems that operate above 817 MHz/862 MHz.

147. Although reconfiguration of the 800 MHz band will eliminate the interference-prone interleaving of ESMR and public safety systems in the 800 MHz band, it will require changing the operating frequencies of many 800 MHz public safety, CII and other non-cellular licensees. This will be done incrementally in the fifty-five Regional Planning areas in the United States. In general, more modern 800 MHz systems can be changed in frequency with only minor changes, most of which can be implemented in software.³⁹⁵ Older systems may require part changes, and, in some instances, replacement of entire transmitters and receivers. The overall band reconfiguration process will also require spectrum

³⁹¹ *Id.*

³⁹² *Id.* at Appendix F, F-8 § 4.1.2.

³⁹³ See Attachment to Letter, dated September 17, 2002 [sic], filed September 22, 2003 from Alan S. Tilles, Esq. Counsel to the City and County of Denver to Marlene H. Dortch, Secretary, Federal Communications Commission at 7.

³⁹⁴ We expect that most public safety systems will operate below 814/859 MHz, but public safety systems will have the option of operating in the Expansion Band or Guard Band segments between 814-817/859-862 MHz should they elect to do so.

³⁹⁵ On July 30, 2003, the Consensus Parties conducted a live demonstration of base station and portable retuning using both Motorola and Kenwood equipment. The retuning was accomplished within a brief period without the need to change any system components. The "down-time" of the equipment was minimal. In one instance, the technicians demonstrated use of a portable base station that was substituted, temporarily, for the equipment being retuned. In the latter demonstration, the only "down-time" was the few seconds required to disconnect and reconnect the system antennas. The Consensus Parties do not claim, nor do we believe, that all systems could be retuned with equal facility; however the demonstration suggests that retuning time need not be a concern when modern equipment is involved.

“green space;” for example, Nextel systems in the General Category band segment would be moved temporarily into Nextel spectrum at 900 MHz, thereby “clearing” the General Category band segment. Next, the current NPSPAC channels would be moved into the cleared space at 806-809 MHz/851-854 MHz. Nextel has accomplished band reconfiguration before, albeit on a smaller scale, when it cleared the Upper 200 channels of incumbent users. Based on data derived from inspection of sixteen public safety systems of varying complexity, Nextel has estimated the total cost of band reconfiguration at \$850 million and has pledged to pay up to that amount. There is some disagreement over Nextel’s estimates; but no real basis of choosing among competing band reconfiguration proposals on the basis of price: Nextel is the only party to this proceeding that has made a firm commitment to absorb the cost of band reconfiguration, including reconfiguration of its own systems, a factor not included in the \$850 million estimate.³⁹⁶

148. We are sensitive to the concerns of those parties, including some public safety agencies whose systems do not now receive interference from ESMR and cellular telephone cells, who assert that reconfiguring the 800 MHz band could unnecessarily disrupt their communications while their operating frequencies are changed, or that their new channels would not be comparable to their original channels.³⁹⁷ We are committed to ensuring that band reconfiguration will not result in degradation of existing service. We believe the rules we adopt today will ensure both continuity of service and “comparable facilities.” With respect to the latter, we note that the rules we adopt today track rules the Commission has successfully used to accomplish previous band reconfigurations.³⁹⁸

2. New 800 MHz Band Plan

a. Band Plan Overview

149. In evaluating the various band reconfiguration plans submitted in this proceeding, we sought to identify, in each plan, five principal components that we deemed essential to the final “Commission Band Plan”:

- The extent to which a plan would abate unacceptable interference to non-cellular systems operating in the 800 MHz band.
- The extent to which incumbents would be treated most fairly, including the degree of disruption associated with channel changes, the ability to provide relocated incumbents with truly comparable spectrum and minimum interruption of critical public safety and CII communications. These factors weighed heavily in our rejection of proposed band plans that contemplated using the Upper 700 MHz spectrum for public safety systems.³⁹⁹

³⁹⁶ The Consensus Plan envisions that Nextel would fund the reconfiguration of its own systems separately. See Attachment to Letter, dated March 14, 2004, from Regina M. Keeney, Esq., Counsel to Nextel to Marlene H. Dortch, Secretary Federal Communications Commission.

³⁹⁷ Some such concerns were directed to the Nextel *White Paper* proposal in which B/ILT and non-cellular SMR facilities all were to be relocated to the 700 MHz Guard Band and the 900 MHz land mobile band. That proposal was superseded by the band plan proposed by the Consensus Parties, which retains incumbents in the 800 MHz band, excepting those electing a “2 for 1” proposal whereby they would obtain double their existing spectrum if they relocated from 800 MHz to 900 MHz. See Supplemental Comments of the Consensus Parties at 13.

³⁹⁸ See, e.g., 47 C.F.R. § 90.699(d).

³⁹⁹ The proposal to use the Upper 700 MHz band for public safety was advanced by, among others, AT&T Wireless, Cingular, Alltel, Southern LINC and CTIA. See AT&T Wireless Comments at 7-14; Cingular and Alltel Comments at 16-19; CTIA Comments at 9-10; Alltel, *et al.* Reply Comments at 15-18; CTIA Reply Comments at 4- (continued....)

- A configuration of 800 MHz cellular-architecture channels that would make intermodulation interference less likely—a factor that argued in favor of plans that placed ESMR spectrum in a contiguous block.⁴⁰⁰
- A configuration that would allow effective filters to attenuate signals that fell in the portion of the reconfigured band used by public safety and CII systems.⁴⁰¹
- The amount of additional 800 MHz spectrum in which public safety would have a right to operate.⁴⁰²

(Continued from previous page)

7; Southern LINC Reply Comments at 14-25. We find these plans inferior to most of the other band plans submitted. As an initial matter, the 700 MHz spectrum is unusable in most parts of the country because it is encumbered by television stations—a condition likely to persist for several years. In addition, some of these commenting parties envisioned that, when public safety is moved to the Upper 700 MHz band, the 800 MHz spectrum vacated by public safety licensees could be auctioned to pay for relocation costs. See Cingular and Alltel Comments at 17-18; CTIA Reply Comments at 7. However, no party advancing this proposal has provided either estimates of the cost of relocating the 800 MHz public safety licensees or the revenue that might be obtained from auctioning vacated 800 MHz spectrum. Thus, the economic feasibility of implementing these plans is highly problematic.

⁴⁰⁰ For instance, Nextel states that once it vacates the interleaved spectrum and consolidates its systems in the 816-824 MHz /861-869 MHz band segment, it will be better able to control the spread of intermodulation products from its cell sites. See Nextel Reply Comments, Appendix II at 3; Comments of Nextel to Consensus Parties Reply Comments, Appendix I at 3. By limiting the span between the highest and lowest frequency at any given cell site, Nextel indicates that it will be able to avoid producing third-order intermodulation products that fall on portions of the band occupied by public safety systems. Because an instance of two-tone third-order intermodulation interference is defined by the relationship $F_{\text{INTERMOD}} = 2 \cdot F_1 - F_2$, limiting the difference between the highest and lowest frequency at a cell site correspondingly limits the range over which third-order intermodulation products will fall. See Motorola Comments at 18-19.

⁴⁰¹ See Supplemental Comments of the Consensus Parties at 43 and Appendix F at F-8, item 4.1.2. Nextel believes that reconfiguring the 800 MHz band to separate cellular systems from non-cellular systems will substantially reduce interference to public safety created by OOB. Nextel states that if the 800 MHz band is reconfigured, it can replace current base station transmitter duplexers with new duplexers that will “roll-off” RF energy immediately below 861 MHz. See Comments of Nextel to Consensus Parties Reply Comments, Appendix I at 1-2.

⁴⁰² The Consensus Plan offers additional spectrum rights to public safety by giving it exclusive access to channels below 816/861 MHz that are either vacated by Nextel or by licensees who relocate above 816MHz/861 MHz as described in ¶¶ 152, 158 *infra*. This exclusive access will last for a five-year period after the completion of band reconfiguration. See Consensus Parties Reply Comments at 25. By contrast, Motorola and Preferred proposed plans which provide no additional spectrum rights for public safety after band reconfiguration. See Motorola Reply Comments at 8; Comments of Preferred to the Consensus Parties Reply Comments at 17. NAM and M/A COM propose plans whereby public safety will likely lose spectrum rights in markets where public safety currently operates systems in the General Category (Ch 1-150). For instance, under NAM’s original plan, public safety receives only 0.25 x 0.25 MHz of spectrum rights to relocate systems from the General Category. Therefore, under that plan, public safety would lose spectrum rights in any market where it currently occupies more than ten channels in the General Category. M/A COM’s proposal offers no spectrum rights for relocating public safety systems from the General Category. Therefore, under M/A COM’s proposal, public safety would lose spectrum rights in markets where public safety occupies any spectrum in the General Category. See NPRM, 17 FCC Rcd at 4885 ¶ 22; M/A COM comments at 10. UTC proposed a plan which appears to substantially reduce the amount of spectrum public safety would have access to after band reconfiguration. UTC would allow licensees in the “lower 80” SMR channels to exchange rights with public safety licensees in the NPSPAC band. Under UTC’s plan, however, public (continued....)

150. Although the thrust of our analysis was centered on the 800 MHz band, we also took into account the technical and economic fallout that a given 800 MHz band plan would have on other bands such as the Upper 700 MHz band, the 700 MHz Guard Band, the 700 MHz Public Safety Band, the 900 MHz band, and bands in the 1.5 GHz to 2.1 GHz region; all of which, in one fashion or another, came into play in the overall band reconfiguration proposals evaluated.

151. Of the various plans considered, the Consensus Plan offered benefits in each of the foregoing categories discussed in ¶ 149 *supra* and pointed us to the development of a Commission Band Plan consistent with our goals in this proceeding:

- abating harmful interference currently being encountered by 800 MHz public safety systems;
- minimizing disruption to existing services;
- responsibly managing the spectrum involved—constituting portions of the 700 MHz, 800 MHz, 900 MHz and 1.9 GHz bands⁴⁰³; and
- providing additional spectrum rights for public safety.

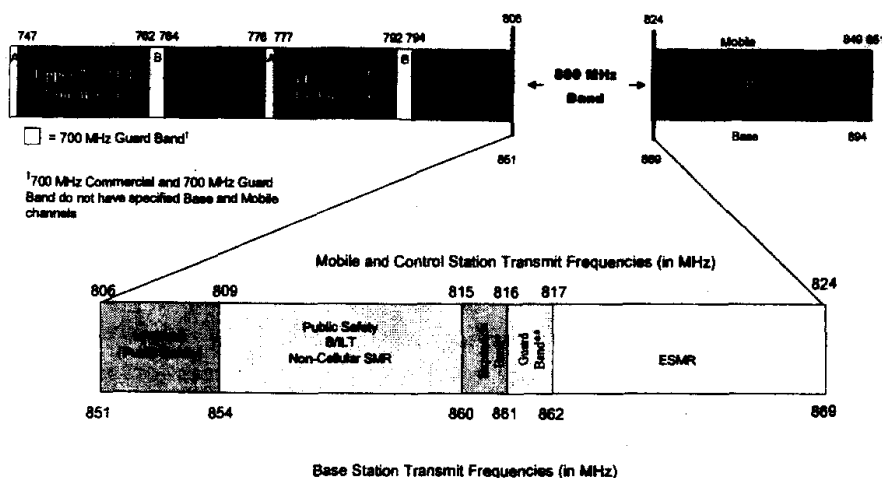
Consequently, we are adopting the following plan for the 800 MHz band.

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safety would exchange 3 x 3 MHz of contiguous NPSPAC spectrum rights for rights to 2 x 2 MHz non-contiguous spectrum in the interleaved portion of the band. See UTC Comments at 26-28.

The OH MARCS, DC OCTO and the original Nextel White Paper plans offer public safety rights to more spectrum after band reconfiguration than the Consensus Plan. See OH MARCS Comments at 5-9; DC OCTO Comments at 6-11 and *NPRM* at 4886-87 ¶¶ 23-25. Nonetheless, the OH MARCS's plan is inferior from an interference mitigation standpoint because it would leave NPSPAC systems immediately adjacent to cellular telephone A-band systems. The DC OCTO plan and the original Nextel White Paper proposals are inferior because of their excessive cost and disruption. Thus, the DC OCTO plan would require almost every non-cellular licensee to relocate within the 800 MHz band. The original Nextel White Paper proposal would require moving all B/ILT and Non-cellular SMR systems out of the 800 MHz band into the 700 MHz and 900 MHz bands.

⁴⁰³ See *NPRM*, 17 FCC Rcd 4887 ¶ 26. With regard to our management of the 1.9 GHz band, we note that we are rededicating five megahertz of spectrum from UPCS—a service for which no equipment has been verified by the Commission—to land mobile communications, thus making more efficient use of the spectrum by bringing new service to the public and rededicating five megahertz of spectrum to land mobile use from “reserve” MSS spectrum, thus providing the opportunity for initiation of a service that may be more immediately and widely used by the public.

New 800 MHz Band Plan⁴⁰⁴

*No public safety system will be required to remain in or relocate to the Expansion Band; although they may do so if they choose.

**No public safety or CII licensees may be involuntarily relocated to occupy the Guard Band.

Non-Cellular Portion (806-817 MHz/851-862 MHz)

- **NPSPAC:** Only NPSPAC systems will be eligible to operate in the 806-809 MHz/851-854 MHz band segment (Channels 1-230, 25 kHz channels spaced every 12.5 kHz).
- **Interleaved:** The interleaved portion of the band at 809-815 MHz/854-860 MHz (Channels 231-470 spaced every 25 kHz) will consist of public safety, B/ILT and SMR channels interleaved. Public safety and CII agencies will have exclusive access to the 809-809.75 MHz/854-854.75 MHz band segment (Channels 231-260 spaced every 25 kHz) and the channels vacated by Nextel below 815 MHz/860 MHz.⁴⁰⁵
- **Expansion Band:** The Expansion Band at 815-816 MHz/860-861 MHz (Channels 471-510 spaced every 25 kHz) will consist of B/ILT and SMR channels interleaved.⁴⁰⁶ The Expansion Band may also be used to house non-Nextel ESMR systems, as discussed *infra*.⁴⁰⁷ No public safety system will be required to remain in or relocate to the Expansion Band; although they

⁴⁰⁴ As with the current 800 MHz band plan, adjustments will be necessary in the areas bordering Canada and Mexico to provide for an equitable distribution of channels with those countries. See ¶¶ 175-176 *infra*.

⁴⁰⁵ See ¶¶ 152-153 *infra*.

⁴⁰⁶ We believe that, under most circumstances, the Expansion Band offers B/ILT, CII and non-cellular SMR licensees equivalent capacity and quality of service as defined in 47 C.F.R. § 90.699(d).

⁴⁰⁷ See ¶ 162 *infra*.

may elect to do so.⁴⁰⁸

- **Guard Band:** The Guard Band at 816-817 MHz/861-862 MHz (Channels 511-550 spaced every 25 kHz) will consist of forty channels available to any 800 MHz licensee. Any licensee operating below 817 MHz/862 MHz may elect to relocate to the Guard Band. The Guard Band may also be used to house non-Nextel ESMR systems, as discussed *infra*.⁴⁰⁹ No 800 MHz licensee may be involuntarily relocated into the Guard Band. Licensees in the Guard Band will receive less interference protection than licensees operating in lower portions of the non-cellular portion of the band as discussed *infra*.⁴¹⁰

Cellular Portion: (ESMR systems at 817-824 MHz/862-869 MHz)

152. As we discuss *infra*, we decline to adopt those portions of the Consensus Plan that contemplate relinquishment of Nextel's 900 MHz spectrum rights.⁴¹¹ With regard to the "running average" of 2.5 megahertz of spectrum rights that Nextel is surrendering in the interleaved segment of the 800 MHz band, we restrict eligibility for this spectrum to public safety licensees for three years from the effective date of this *Report and Order* and to public safety/CII licensees for an additional two years from that date.⁴¹² We make an identical provision for channels vacated by licensees that voluntarily relocate to the 816-817 MHz/861-862 MHz band segment. We believe providing these windows of limited eligibility meets our spectrum management goals by accommodating the generally slow budgetary process of public safety agencies and the express needs of CII licensees, before making the spectrum generally available to other 800 MHz non-cellular licensees, *i.e.* B/ILT and non-cellular SMR licensees.⁴¹³

153. Furthermore, in order to relocate NPSPAC systems to the bottom portion of the band, the Consensus Plan calls for clearing only the 806-809 MHz/851-854 MHz portion of the General Category (Channels 1-120 prior to band reconfiguration). We will require, however, that all non-public safety or non-CII licensees operating in the General Category (Channels 1-150 prior to band reconfiguration) relocate to the Guard Band, Expansion Band or interleaved portion of the band. The thirty remaining General Category channels available after the NPSPAC band is relocated will be available only to public safety licensees for three years from the effective date of this *Report and Order* and to public safety/CII

⁴⁰⁸ See ¶ 154-155 *infra*.

⁴⁰⁹ See ¶ 162 *infra*.

⁴¹⁰ See ¶ 158 and Figure 1 *infra*.

⁴¹¹ See ¶ 207 *infra*.

⁴¹² This time period is a modification of the Consensus Parties' original proposal to only allow public safety access to this spectrum for a five-year period. See *Supplemental Comments of the Consensus Parties* at 12. Our modification comes in response to the comments of CII parties who found this too restrictive. See, *e.g.*, *Comments of Alliant Energy to Supplemental Comments of the Consensus Parties* at 4, and *Comments of Amaren to Supplemental Comments of the Consensus Parties* at 10-11. If Nextel does not surrender its rights to operate on this spectrum, Nextel channels would remain adjacent to public safety channels potentially causing adjacent channel OOB interference, one of the major types of interference we are seeking to abate in this proceeding.

⁴¹³ See "Public Safety and Sound Spectrum Management Go Hand in Hand," Keynote Address by Federal Communications Commission Commissioner Kathleen Q. Abernathy to the National Forum on Public Safety Spectrum Management, February 10, 2004. We make these modifications under the authority granted us by Sections 4, 301, 303 and 316 of the Act, 47 U.S.C. §§ 316, 303, 301, and 154(i). We set forth a detailed description of our legal authority in ¶¶ 62-87 *supra*.

licensees for an additional two years from that date.⁴¹⁴ Therefore—regardless of how much spectrum Nextel occupies in any given region—public safety and then CII licensees will have nationwide access to thirty channels or 1.5 megahertz of spectrum immediately adjacent to the relocated NPSPAC band.

b. Expansion Band

154. We establish an “Expansion Band” in the 815-816 MHz/860-861 MHz segment of the 800 MHz band to provide public safety licensees spectral separation from the cellular portion of the band. Although occupants of the Expansion Band will receive full interference protection, we note the Consensus Parties comments indicating that those licensees who operate in the 2 x 2 MHz segment of the band immediately adjacent to the cellular portion of the band should employ “campus-type” or other interference-resistant type systems.⁴¹⁵ Therefore, we believe it prudent to allow all public safety licensees the option to relocate from this portion of the band and no public safety licensee will be forced to relocate to this portion of the band. Nonetheless, any public safety licensee who willingly chooses to remain or relocate to the Expansion Band may do so.

155. The establishment of the Expansion Band required us to revise the chart in our rules that specifies channels for public safety use in the 800 MHz band.⁴¹⁶ Specifically, twelve channels currently designated for public safety use are located within the newly created Expansion Band. Because we are allowing public safety licensees to relocate out of the Expansion Band, we needed to find a new “home” for these twelve public safety channels. Therefore, we “exchanged” these twelve public safety channels for twelve SMR channels located below the Expansion Band. As a result of this exchange, all public safety channels will now be located below the Expansion Band. In order to ensure that non-cellular SMR licensees lose no spectrum in this “exchange,” licensees from this category will now have access to the former twelve public safety channels located in the Expansion Band.⁴¹⁷

156. The current chart designating public safety channels, lists the channel in groups with channels separated by one megahertz⁴¹⁸ as a concession to the fact that the combiners used in a trunked system to combine the output of multiple transmitters into a single antenna can introduce excessive loss if used with channels that are too closely spaced.⁴¹⁹ In modern systems, however, combiners suffer negligible loss even when the input channels are spaced as little as 250 kHz apart;⁴²⁰ thus in the revised

⁴¹⁴ See 47 C.F.R. § 90.615 in Appendix C *infra*.

⁴¹⁵ See Consensus Parties Reply Comments at 9.

⁴¹⁶ See 47 C.F.R. § 90.617(a), Table 1 in Appendix C, *infra*.

⁴¹⁷ Because we “exchanged” all public safety channels in the Expansion Band with SMR channels, the Expansion Band will consist of a mix of B/ILT and SMR channels. Nonetheless, we will allow public safety licensees to remain in the Expansion Band if they so choose. In addition, any public safety licensee who chooses to relocate to the Expansion Band may do so through inter-category sharing. See 47 C.F.R. §§ 90.621(e) and 90.677 in Appendix C *infra*.

⁴¹⁸ See 47 C.F.R. § 90.617(a), Table 1.

⁴¹⁹ “Loss” in this context refers to the attenuation of the transmitter carrier when it passes through the combiner. The loss is dissipated in the form of heat and the net result is that the ERP—and hence the coverage—of a system can be reduced significantly if the combiner introduces excessive loss.

⁴²⁰ See Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010; Establishment of Rules and (continued....)

table, we separate grouped public safety channels by 500 kHz.⁴²¹ Since the new twelve public safety channels were pulled from the SMR pool, there will be non-cellular SMR licensees operating on these channels. Therefore, we hereby grandfather those non-cellular SMR licensees that are operating on the new public safety channels for an indefinite period, and we will permit the filing of modification applications by these grandfathered licensees.⁴²² These grandfathered licensees will operate on a strict non-interference basis, subject to pre-coordination of any new of modified operations.⁴²³

c. Guard Band

157. We establish a "Guard Band" in the 816-817 MHz/861-862 MHz segment of the 800 MHz band to guarantee public safety licensees an additional one megahertz spectral separation from the cellular portion of the band. Nextel will vacate the Guard Band. No licensee—including public safety and CII—will be involuntarily relocated to the Guard Band. We will grandfather all non-Nextel CMRS licensees who currently operate within the Guard Band. These grandfathered licensees will be permitted to continue operating on current frequencies, with currently authorized facilities, on a strict non-interference basis, subject to pre-coordination of any new of modified operations.⁴²⁴ However, we will not accept new non-public safety applications on any of the twelve new 800 MHz public safety frequencies.

158. Once Nextel has vacated the Guard Band any 800 MHz band licensee currently operating below 816 MHz/861 MHz may apply for channels there. Any channel below 816 MHz/861 MHz vacated by a licensee relocating to the Guard Band will be available only to public safety licensees for three years from the effective date of this *Report and Order* and to public safety/CII licensees for an additional two years from that date. Licensees who voluntarily relocate to the Guard Band after Nextel has vacated will be required to tolerate increasing levels of interference from cellular-architecture systems as a function of increasing frequency.⁴²⁵ The minimum median received power level required for interference protection (-104 dBm for mobile units or -101 dBm for portable units) will increase as shown in Figure 1, below. The channels these licensees vacate in the spectrum below 816 MHz/861 MHz will be available to public

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Requirements for Priority Access Service, WT Docket No. 96-86, *Third Memorandum Opinion and Order and Third Report and Order*, 15 FCC Rcd 19844, 19857 (2000).

⁴²¹ See 47 C.F.R. § 90.617(a), Table 1 in Appendix C, *infra*.

⁴²² We believe that there is little risk of interference to public safety from these grandfathered non-cellular SMR incumbents. These incumbents will be prohibited from operating cellular systems in the non-cellular portion of the 800 MHz band. See 47 C.F.R. § 90.614 in Appendix C, *infra*. Further, any grandfathered site-based B/ILT or non-cellular SMR licensee who chooses to modify its license on one of these new public safety channels will be required to obtain frequency coordination and receive concurrence from a certified public safety coordinator. See 47 C.F.R. §§ 90.175(c) and (e). EA-based non-cellular SMR licensees who are grandfathered on these new public safety channels and choose not to relocate—while not subject to frequency coordination—will nonetheless be limited to operating within the EA of their license. See 47 C.F.R. § 90.683(a).

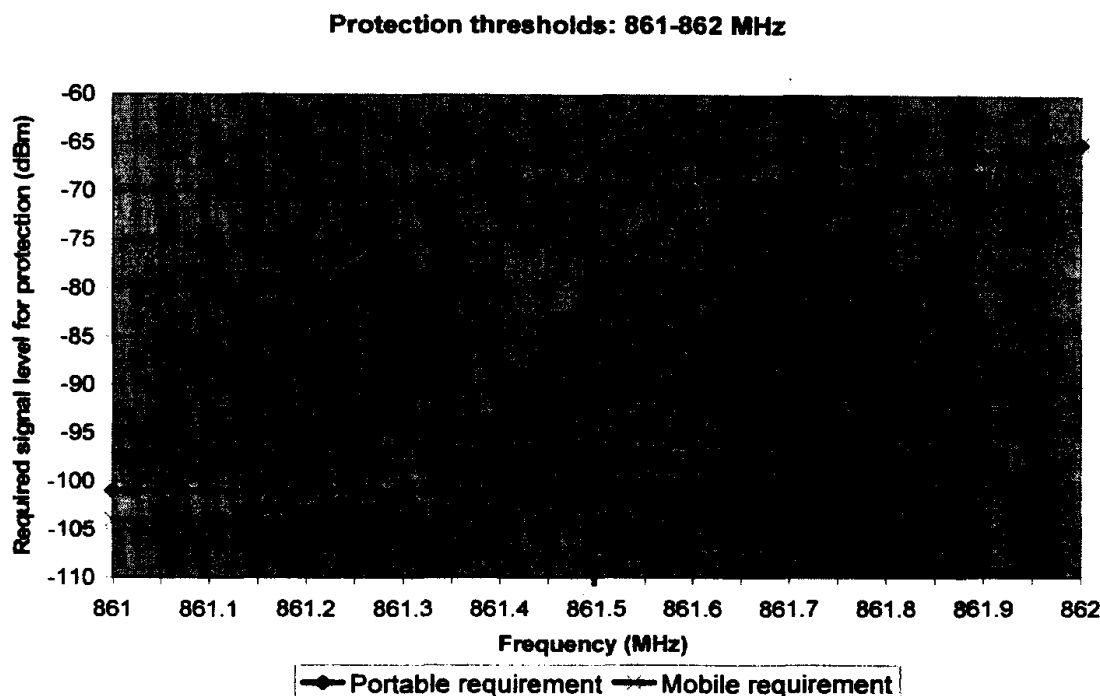
⁴²³ See 47 C.F.R. § 90.617(j) in Appendix C *infra*.

⁴²⁴ *Id.*

⁴²⁵ The Guard Band would serve a purpose similar to the guard band channels developed to protect public safety systems from interference from commercial systems in the 700 MHz band. Cellular operations are prohibited in the 700 MHz guard band channels (746-747 MHz, 776-777 MHz, 762-764 MHz, and 792-794 MHz) to provide a buffer between public safety and commercial spectrum allocations. See 47 C.F.R. § 27.2(b).

safety licensees for five years and to CII licensees during years four and five of the five-year period.⁴²⁶

FIGURE 1: Required Received Signal Levels for Interference Protection



d. Relocating ESMR Operations in 800 MHz Band

159. We recognize that there are CMRS licensees other than Nextel using iDEN or iDEN-like ESMR technology in the 800 MHz band. For example, Southern LINC, a Nextel competitor, operates ESMR systems using Motorola iDEN technology in Georgia, Mississippi, Alabama and Florida.⁴²⁷ Airtell Wireless, LLC, and Nevada Wireless, LLC, operate an iDEN derivative, the Harmony system, on the interleaved channels in areas of Montana and Nevada, and represent that they will be constructing Harmony systems in other markets.⁴²⁸ Preferred Communications, Inc. holds spectrum rights in various areas of the continental United States and has extensive 800 MHz band spectrum rights in the Commonwealth of Puerto Rico and the U.S. Virgin Islands.⁴²⁹ Some of these parties operating cellular-architecture systems in the 800 MHz band note that their systems have already created interference to public safety systems.⁴³⁰

160. The Consensus Parties did not discuss these other CMRS cellular-architecture systems,

⁴²⁶ See 47 C.F.R. § 90.617(h) in Appendix C *infra*.

⁴²⁷ See Southern LINC Comments at 4.

⁴²⁸ See Letter, dated November 7, 2003, from Elizabeth Sachs, counsel for Airtell Wireless and Nevada Wireless to Marlene H. Dortch, Secretary, Federal Communications Commission.

⁴²⁹ See Comments of Preferred to the Consensus Parties Reply Comments at 8.

⁴³⁰ *Id.*

supra, but did propose that the Commission should grandfather Southern LINC's operations in the 809-821 MHz/854-866 MHz block while relocating Southern LINC's systems that currently operate in the 806-809 MHz/851-854 MHz block to the upper portion of the non-cellular segment as close as possible to the ESMR segment.⁴³¹ The Consensus Parties proposed allowing Southern LINC to operate its cellularized systems in the non-cellularized portion of the band without a waiver but with a requirement to notify all affected licensees before implementing low-site cells.⁴³² Under the Consensus Plan, Southern LINC would be required to pre-coordinate such operations to prevent unacceptable interference to non-cellular licensees and would be responsible for eliminating any interference.⁴³³ The Consensus Parties did not discuss other ESMR licensees such as those mentioned *supra*. For its part, Southern LINC contends that it should be relocated to the ESMR segment, without loss of channels, where it would share spectrum with Nextel.⁴³⁴

161. We find the Consensus Parties' proposal for relocation of Southern LINC's facilities⁴³⁵ too incomplete—to the extent it does not address other similarly situated licensees—and too limited. With respect to the proposal to grandfather Southern LINC's existing operations, we note that there is no evidence that these operations currently cause interference to other 800 MHz band licensees.⁴³⁶ However, we can foresee that Southern LINC, in order to meet increasing subscriber demands, may desire to deploy "low site" cells which could be a source of interference to public safety and other non-cellular licensees. The interference potential is heightened because many of Southern LINC's channels are immediately adjacent to channels used by non-cellular licensees in the interleaved portion of the band. As a general proposition, ESMR systems operating in the 817-824 MHz/862-869 MHz segment of the band are less likely to cause interference than ESMR systems operating in the interleaved portion of the band. We therefore believe that the overall interference environment at 800 MHz would improve were we to allow licensees such as Southern LINC to relocate their systems to the ESMR portion of the band where they have less potential for interference to public safety and other non-cellular 800 MHz band licensees. Confining licensees such as Southern LINC to operation below 817 MHz/862 MHz is not optimal from an interference protection standpoint and could adversely affect such licensees' ability to provide adequate service to its subscribers in the future.

(i) Relocation Options

162. In order to provide an incentive for ESMR licensees to relocate their systems, we are affording them the flexibility of three options:

- Relocate all of their systems in a market into the ESMR portion of the band where they will share spectrum with Nextel; or

⁴³¹ See Supplemental Comments of Consensus Parties at 44-46.

⁴³² *Id.*

⁴³³ *Id.* at 45-46. Thus, for example, Southern LINC would be strictly responsible, financially and otherwise, for immediately abating any unacceptable interference; or would have to discontinue operation on the offending frequency or frequencies. *Id.* at 46.

⁴³⁴ See Letter, dated April 5, 2004, from Christine M. Gill, Counsel for Southern LINC to Michael K. Powell, Chairman, Federal Communications Commission.

⁴³⁵ See ¶ 160 *supra*.

⁴³⁶ It attributes the lack of interference to the fact it currently operates few high-channel-density low-elevation sites. See Southern Comments at 6. See also Motorola Comments at 14, n. 24.

- Relocate their systems as close as possible to the ESMR portion of the band but remain in the non-cellular portion of the band, *i.e.* in order of preference: (a) the 816-817 MHz/861-862 MHz Guard Band;⁴³⁷ (b) the 815-816 MHz/860-861 MHz Expansion Band;⁴³⁸ and (c) channels below 815 MHz/860 MHz if necessary. These licensees will operate on a strict non-interference basis, subject to pre-coordination of any new or modified operations;⁴³⁹ or
- Remain on their current channels in the non-cellular portion of the band on a strict non-interference basis, subject to pre-coordination of any new or modified operations.⁴⁴⁰

163. If non-Nextel ESMR licensees elect to relocate to the ESMR portion of the band, their EA licenses will transfer on a channel-by-channel basis, such that they have exclusive, incumbent-free, use of the new channels in the EA.⁴⁴¹ We recognize, however, that many of these non-Nextel ESMR licensees employ a patchwork of EA-based and site-based licenses. Therefore, we will give these licensees the option to relocate their site-based licenses along with their EA-licenses to the ESMR portion of the band. In order to transfer a site-based channel into the ESMR segment, a licensee must: (a) currently hold an EA license in the relevant market; and (b) be using the site-based license as part of a cellular-architecture system in that market as of the date of publication of this *Report and Order* in the Federal Register. Furthermore, to create a more uniform licensing scheme, the transferred site-based license will be converted to an EA-wide, incumbent-free license in the ESMR portion of the band. If non-Nextel ESMR licensees elect not to relocate to the ESMR portion of the band, but volunteer to relocate to the Guard Band or must be relocated to the Expansion Band or to the spectrum immediately below, when necessary, they must be provided comparable facilities, in the case of their site-based licenses; and, in the case of EA licenses, exclusive use of their new channels in the EA.⁴⁴²

(ii) Expanded ESMR Spectrum

164. We are aware that, in some markets, there may be insufficient spectrum in the 816-824 MHz/861-869 MHz band segment to accommodate both incumbent ESMR licensees already operating there and new ESMR entrants migrating from the lower channels. This is particularly true of certain markets in which both Southern LINC and Nextel currently are offering service. In those markets, Southern LINC holds a large number of licenses in the interleaved portion of the band, and also holds licenses for some General Category channels. Consequently, there are an inadequate number of channels in the 816-824 MHz/861-869 MHz band segment to replicate the existing channel capacity of both Southern LINC and Nextel. We note recent *ex parte* filings in which Southern LINC and Nextel recite a preliminary agreement in which they propose that the 816-824 MHz/861-869 MHz ESMR segment be widened by five megahertz, such that the lower band edge would start at 813.5 MHz/858.5 MHz.⁴⁴³ With the ESMR

⁴³⁷ See ¶¶ 157-158 *supra*.

⁴³⁸ See ¶¶ 154-156 *supra*.

⁴³⁹ See 47 C.F.R. § 90.617(j) in Appendix C *infra*.

⁴⁴⁰ *Id.* These operators, however, would be subject to possible frequency moves as necessary in order to implement reconfiguration of the 800 MHz band.

⁴⁴¹ These non-Nextel ESMR licensees must state their option in the realignment schedule that the Transition Administrator will transmit to the Commission. See ¶ 201 *infra*.

⁴⁴² See ¶ 201 *infra*.

⁴⁴³ See Letter, dated June 30, 2004, from James B. Goldstein, Esq., Senior Attorney, Nextel Communications, Inc. to Michael Wilhelm, Deputy Chief - Legal, Public Safety and Critical Infrastructure Division, (continued....)

portion of the band so widened, Southern LINC and Nextel would engage in a channel exchange that would result in the configuration of channels shown in Appendix G, which also includes a map of the area in which the ESMR portion of the band would be increased, and the list of counties within the area shown on the map.

165. We note from the *ex parte* filings that the Southern LINC and Nextel agreement is not final and that the parties have not been able to agree on a final apportionment of channels in the Atlanta, Georgia market. Because of the preliminary nature of the agreement, we need not address it further here, but encourage the parties to come to an agreement that is equitable for all licensees involved.

166. Although we do not rule on the acceptability of the provisions contained in the preliminary agreement, the filings inform us that the distribution of cellular-architecture and non-cellular systems in the area shown in Appendix G is atypical. Moreover, we believe that we should change the band plan for that region now, before band reconfiguration commences, so that the overall band reconfiguration process takes the revised band plan into account. Accordingly, on our own motion, we define the ESMR band in the area shown in Appendix G as the band segment 813.5 - 824 MHz/858.5-869 MHz. The Expansion Band in this area shall extend from 812.5-813.5 MHz/857.5-858.5 MHz. All licensees operating in the band segment 806-813.5 MHz/851-858.5 MHz shall be afforded the same protection against unacceptable interference as specified in ¶¶ 96-141, *supra*.

167. Moreover, because Southern LINC's recent *ex parte* submission indicates that it intends to exercise the option of relocating into the ESMR portion of the band, we will give Nextel and Southern LINC the opportunity to finalize their agreement and recommend a channel distribution that equitably reflects the interests of all 800 MHz licensees in the area shown in Appendix G. That agreement shall be completed and submitted to the Commission for review no later than thirty days following the publication of this *Report and Order* in the Federal Register. The agreement must include mutual non-disclosure provisions and a clear delineation of the costs to be borne by each party. It shall also include a proposed band reconfiguration schedule consistent with the obligations we have imposed on Nextel in this *Report and Order*. The agreement also shall contain an engineering analysis demonstrating that the channel plan can be implemented consistent with public safety and B/ILT licensees retaining the spectrum necessary to accommodate them. We delegate to the Chief of the Wireless Telecommunications Bureau, the authority to review the agreement, and to resolve any disputed matters submitted to the Commission for *de novo* review.

168. In the event the parties fail to reach agreement by the date specified *supra*, they shall submit their differences to the Transition Administrator who will attempt to facilitate a final agreement. If the disputed matters are not resolved within thirty days, the Transition Administrator will submit the entire record to the Commission for *de novo* review. Parties are hereby put on notice that disputed matters concerning ESMR channels in any area of the country, including the area shown in Appendix G may be resolved by the Commission making a *pro rata* distribution of ESMR channels.⁴⁴⁴ In the case of the area

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Wireless Telecommunications Bureau, Federal Communications Commission. See also Letter, dated June 30, 2004, from Christine M. Gill, Esq., Counsel to Southern LINC to Michael Wilhelm, Esq., Federal Communications Commission.

⁴⁴⁴ When the ESMR spectrum is not adequate to accommodate all eligible licensees that wish to relocate to the ESMR block, and parties are unable to agree, we may apportion the ESMR block as a function of the relative spectrum rights each licensee holds in a given EA. For example, in a hypothetical market, outside the area shown in Appendix G, in which licensee "A" currently has rights to 150 channels and licensee "B" has rights to 250 channels, the 320 channels in the ESMR block would be apportioned by giving licensee "A" access to 128 channels (40%) and licensee "B" access to 192 channels (60%).

shown in Appendix G, a *pro rata* apportionment could reduce the current number of channels available to Nextel. However, we observe that Nextel has additional spectrum at 900 MHz which can be used to offset the shortfall and is receiving spectrum at 1.9 GHz. With respect to Southern LINC, we observe that its relocation to the ESMR block would provide Southern LINC with clear, contiguous spectrum arguably of greater value and capacity than the spectrum it now occupies. This would occur because, in some instances, Southern LINC would receive clear spectrum, in exchange for site-based channels which cannot currently be used in the entire EA because of the need to protect incumbents.

169. Finally, because we are extending the ESMR band to 813.5 MHz/858.5 MHz in the counties listed in Appendix G, some coordination between licensees will be necessary at the edge of these counties. Specifically, ESMR licensee operating within these counties will be required to maintain minimum co-channel spacing distances to incumbent non-cellular licensees operating just outside these counties.⁴⁴⁵ In addition, there may be instances where a non-cellular licensee operating just outside these counties may need to relocate above 813.5 MHz/858.5 MHz in order to complete band reconfiguration. In these instances, the ESMR licensees operating within the counties listed in Appendix G will make all necessary accommodations in order to provide the non-cellular licensee with the minimum required co-channel spacing on the new channel.⁴⁴⁶

e. Permitting Additional Non-ESMR Cellular Architecture Systems in the 800 MHz Band

170. Some CII parties, such as utilities, contend that excluding cellular systems from the non-cellular portion of the 800 MHz band (806-817 MHz/851-862 MHz) will impose a hardship on CII licensees whose communications needs require a transition of their systems to cellular architecture.⁴⁴⁷ We wish to proceed cautiously in this area out of concern over replicating the unacceptable interference problem we are attacking through band reconfiguration; but we also wish to avoid unnecessarily constraining the use of innovative technology in the process. The record suggests that CII cellular systems, with well-designed network architecture, can operate without causing unacceptable interference so long as they avoid the high-density cell operations that have been a frequent source of interference to date. We reach this finding in part because we do not anticipate that such CII or public safety systems will require high density, high user-capacity systems such as those used by CMRS licensees. The "non-CMRS" nature of these systems would suggest that they would not grow to have such high user demand that extensive deployment of low site cells would be required.⁴⁴⁸

⁴⁴⁵ See 47 C.F.R. § 90.621.

⁴⁴⁶ We note that co-channel spacing may be reduced through short-spacing agreements. See 47 C.F.R. § 90.621(b)(5).

⁴⁴⁷ See Comments of Cinergy to Supplemental Comments of Consensus Parties at 19; Comments of AMTA to Supplemental Comments of Consensus Parties at 4; Comments of Baltimore to Supplemental Comments of Consensus Parties at 7; Comments of Entergy to Supplemental Comments of Consensus Parties at 29; Comments of Scott C. Macintyre to Supplemental Comments of Consensus Parties at 1; Reply Comments of Cinergy to Supplemental Comments of Consensus Parties at 28; Reply Comments of Con-Ed to Supplemental Comments of Consensus Parties at 10; letter, dated May 6, 2004, from Shirley Fujimoto, Council for Entergy Corporation, Consumers Energy and Cinergy Corporation, to John Muleta Chief, Wireless Telecommunications Bureau, Federal Communications Commission (Entergy, Consumers and Cinergy May 6 *Ex Parte*).

⁴⁴⁸ We note that, because we are affording CII licensees a special status because of their safety-related communications, we believe it would be anomalous to allow CII licensees to convert their systems to CMRS operation in which communications seldom are safety-related. Accordingly, we limit our definition of CII to those (continued....)

171. In this regard, the Consensus Parties offer a definition for the type of "high-density cellular" system they believe should be prohibited from operating in the non-cellular portion of the 800 MHz band.⁴⁴⁹ The Consensus Parties would define a "high-density cellular" system as any system with (1) five or more overlapping interactive sites featuring hand-off capability; (2) any one of such sites having an antenna height of less than 100 feet above ground level with an antenna height above average terrain (HAAT) of less than 500 feet; (3) and any one of such sites having more than twenty paired frequencies.⁴⁵⁰

172. Several CII licensees, however, believe that the Consensus Parties definition is overly broad and would unduly limit the operation of many non-CMRS systems that pose little or no likelihood of harmful interference to other licensees in the 800 MHz band.⁴⁵¹ For instance, these CII licensees contend that the Consensus Parties definition would prohibit systems where any of these characteristics are present even though no individual site exhibits all of these characteristics.⁴⁵² Therefore, these CII licensees suggest applying the Consensus Parties definition on a site-by-site basis rather than on a system-wide basis.⁴⁵³ We agree. The Consensus Parties were unclear about whether their definition should be applied system-wide or on a site-by-site basis. We believe that only sites which exhibit all of the characteristics described by the Consensus Parties would likely cause interference to other licensees in the 800 MHz band. Therefore, we will permit licensees to operate cellular-architecture systems in the non-cellular portion of the band without need for waiver so long as those systems are not high-density cellular systems under the following definition of "800 MHz cellular system":⁴⁵⁴

- a system having more than five overlapping interactive sites featuring hand-off capability; and
- any one of such sites has an antenna height of less than 100 feet above ground level with an antenna height above average terrain (HAAT) of less than 500 feet and more than twenty paired frequencies.⁴⁵⁵

173. If a licensee does wish to operate an 800 MHz cellular system, it will be required to obtain waivers for any and all sites that meet the second of our two criteria. In that case, a CII or public safety system licensee may avail itself of the Commission's waiver process pursuant to the waiver criteria set out in Section 1.925 of the Commission's Rules.⁴⁵⁶ Any such request shall contain both a persuasive (Continued from previous page)

entities who operate radios systems for private internal use. *See n. 11supra*. Any licensee who converts to CMRS will fall outside our definition of CII and no longer be eligible for any of the benefits we extend to CII licensees

⁴⁴⁹ See Reply Comments of Consensus Parties to Supplemental Comments of Consensus Parties at 28.

⁴⁵⁰ *Id.*

⁴⁵¹ See Entergy, Consumers and Cinergy May 6 *Ex Parte* at 1.

⁴⁵² *Id.* at 1.

⁴⁵³ *Id.*

⁴⁵⁴ We emphasize that this definition of "800 MHz cellular system" applies only for this purpose in the 800 MHz band, and is not intended as a basis for making cellular/non-cellular distinctions for other purposes.

⁴⁵⁵ We recognize that this definition encompasses operations where the overlapping interactive sites comprise only a portion of the overall communications "system" of a licensee. The licensee needs to obtain a waiver, however, only with respect to particular sites in the overlapping site clusters that satisfy the second criterion.

⁴⁵⁶ 47 C.F.R. § 1.925.

showing of need and a demonstration of non-interference. Any waiver granted, will contain a continuing non-interference condition.⁴⁵⁷ As stated above, cellular-architecture systems that do not come within the foregoing "800 MHz cellular" definition may be operated without need for a rule waiver; nonetheless, they must not cause unacceptable interference to 800 MHz "high-site" non-cellular systems. Our reason for requiring waivers for sites in high-density cellular systems is, in one respect, a means to ensure that system designers "do their interference abatement homework" before seeking Commission authorization for a facility in the non-cellular portion of the band. Moreover, proceeding only pursuant to waiver will allow us to more carefully gauge the effect that such high-density cellular technology in the non-cellular portion of the 800 MHz band would have. We can then revisit the matter at a later date before serious harm is done if new systems proliferate and cause unacceptable interference. Most importantly, were we to decide, here, to allow unrestricted, high density cellular operation in the non-cellular portion of the band, we would undo four years of intensive study and terminate this proceeding by virtually issuing an invitation for a high-density, multi-cell operator to construct interference-generating systems in incompatible spectrum and potentially put our first responders at risk and threaten their ability to adequately address Homeland Security threats. We will monitor this cellular restriction carefully and revisit it if necessary. As with any of our rules, waivers are available to accommodate special circumstances. However, there would be a high burden to surmount for any party seeking a waiver for CMRS operation.

174. As stated above, our definition of "800 MHz cellular system" should not be interpreted to allow cellular-configuration systems that do not come within the cellular definition to cause unacceptable interference or to relieve them from the cost and other responsibility for promptly abating unacceptable interference in the 800 MHz band should it occur. Rather, our cellular definition in the 800 MHz band context serves only as a demarcation between systems that can operate in the non-cellular portion of the 800 MHz band without a waiver and those that require a waiver.

3. Border Regions

175. Several parties note, and we concur, that no feasible band plan suggested in this proceeding comports with the current arrangement the United States has with Canada or with the protocols it has with Mexico for use of the 800 MHz band in the border areas. The existing border band plans, contained in Section 90.619 of our rules have evolved from periodic negotiations with these countries and have been adjusted from time to time. The border band plans are not consistent along the border; there are different distributions of channels in given border regions, primarily because of demographic considerations. The Consensus Parties were the only party to file a band plan for the border area; and several commenting parties, including Industry Canada—pointed out that the border area plan proposed by the Consensus Parties' had multiple flaws, including:

- *Mutual Aid Channels.* The border area plan fails to maintain channels designated by international agreements for mutual aid with Canada and Mexico.⁴⁵⁸ The Consensus Parties

⁴⁵⁷ Any cellular architecture system operating in the non-cellular portion of the band, whether authorized by waiver or otherwise, must strictly comply with the provisions of Section 90.673 as adopted in this *Report and Order*.

⁴⁵⁸ See Comments of King County RCB to Supplemental Comments of the Consensus Parties at 4; Comments of MI DIT to Supplemental Comments of the Consensus Parties at 5; Comments of NY OIT to Supplemental Comments of the Consensus Parties at 6-8; Reply Comments of NY OIT to Supplemental Comments of the Consensus Parties at 5-6. Current international agreements designate five channels in the NPSPAC portion of the band (821-824/866-869 MHz) for public safety mutual aid between the U.S. and Canada and Mexico. These five channels are intended to facilitate interoperability between Canadian, Mexican and U.S. public safety licensees. The mutual aid channels are 821.0125/866.0125 MHz (calling), 821.5125/866.5125 MHz, 822.0125/867.0125 (continued....)

suggest relocating these channels to the lower portion of the 800 MHz band.⁴⁵⁹ The Consensus Parties, however, fail to explain how users in Mexico or Canada would be compensated for retuning or replacement of equipment needed to operate on the new mutual aid channels.

- *Maintaining Spectrum for Various Pools.* The Consensus Parties' border area plan fails to maintain comparable spectrum for various 800 MHz band pools (public safety, B/ILT, SMR).⁴⁶⁰ For instance—in certain regions—public safety loses channels after band reconfiguration while ESMR licensees gain channels after band reconfiguration.⁴⁶¹
- *Public Safety Spectrum in Mexico Border Area.* Many of the channels in the Consensus Parties' border plan, designated for public safety use in the Mexico Border Region—after band reconfiguration—may be unusable because of short-spacings to co-channel incumbents outside of the border area.⁴⁶² For instance—due to co-channel spacing requirements—incumbent non-border licensees may “block” numerous channels designated for public safety use in San Diego, CA and Tucson, AZ.⁴⁶³
- *U.S. Operations on Canada/Mexico Primary Channels.* The Consensus Parties' border area plan is silent on relocation of U.S NPSPAC systems currently operating on Canada or Mexico primary channels.⁴⁶⁴
- *Channel Spacing.* The Consensus Parties' border area plan would reduce the span of frequencies available to B/ILT and non-cellular SMR licensees thus greatly reducing the span

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MHz 822.5125/867.5125 MHz and 823.0125/868.0125 MHz. See *U.S.-Mexico Agreement*, Appendix C at Section 1 and *1990 U.S.-Canada Agreement* at Section 2.1c.

⁴⁵⁹ See Supplemental Comments of the Consensus Parties, Appendix G-4.

⁴⁶⁰ See Comments of American Elec. to Supplemental Comments of the Consensus Parties at 15-16; Comments of Boeing to Supplemental Comments of the Consensus Parties at 5-8; Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties at 6-8; Comments of Consumers to Supplemental Comments of the Consensus Parties at 11-12; Comments of NY OIT to Supplemental Comments of the Consensus Parties at 4-6; Comments of Pinnacle to Supplemental Comments of the Consensus Parties at 6; Reply Comments of Boeing Reply to Supplemental Comments of the Consensus Parties at 9; Reply Comments of Central ME Power to Supplemental Comments of the Consensus Parties at 2-3; Reply Comments of Consumers Energy to Supplemental Comments of the Consensus Parties at 5-6; Reply Comments of NY OIT to Supplemental Comments of the Consensus Parties at 4-5; Reply Comments of San Diego Reply to Supplemental Comments of the Consensus Parties at 2-5.

⁴⁶¹ See Comments of American Elec. to Supplemental Comments of the Consensus Parties at 16; Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties, Exhibit B at 3; Comments of Pinnacle to Supplemental Comments of the Consensus Parties at 6; Comments of NY OIT to Supplemental Comments of the Consensus Parties at 6.

⁴⁶² See Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties, Exhibit A at 1-2, Exhibit B at 1-2, 7-8; Comments of San Diego to Supplemental Comments of the Consensus Parties at 2-4. Co-channel stations are generally required to maintain a fixed distance separation of 70 miles (113 km). See 47 C.F.R. § 90.621(b).

⁴⁶³ *Id.*

⁴⁶⁴ See Comments of Snohomish County ERS to Supplemental Comments of the Consensus Parties at 2-3.

of frequencies which can be combined into a trunked system.⁴⁶⁵

- *Exacerbating the "Double Border."* Border area licensees currently need to coordinate both with licensees outside the U.S. (Mexico/Canada) and U.S. licensees in the non-border area. The Consensus Parties' reconfiguration plan exacerbates this problem due to the extensive channel relocations involved in band reconfiguration.⁴⁶⁶
- *Canada/Mexico NPSPAC Licensees.* The Consensus Parties make no mention of whether their reconfiguration proposal will negatively affect NPSPAC operations in Canada and Mexico.⁴⁶⁷ Under the Consensus Parties band plan, after band reconfiguration, ESMR operations on the U.S. side of the border would operate on the same channels as NPSPAC operations in Canada and Mexico.
- *iDEN Arrangement.* The border area plan will affect a current agreement between the U.S. and Canada to reserve certain channels in the 800 MHz band for iDEN digital networks.⁴⁶⁸

176. We note that our agreements with Mexico and Canada establish a distance beyond which U.S. licensees need not consider border stations when selecting channels. The distance is 140 km (87 mi.) and 110 km (68.4 mi.) from the border for Canada and Mexico, respectively.⁴⁶⁹ Depending on how the border band plans develop, there is the possibility of a "double border." The second border would be created if the overall U.S. band plan differs from a band plan for the border regions. For example, the overall U.S. band plan may assign a given channel for public safety use, e.g. Channel 88 and the border band plan may assign the same channel for ESMR use. In this example, the strict responsibility regime we establish today requires the ESMR Channel 88 licensee to protect the non-cellular 800 MHz system against unacceptable interference. In instances in which a border band plan results in different uses of a given channel for non-cellular systems, e.g. a U.S. SMR system operating in the Mexican border area and a public safety channel operating beyond the 110 km line, *supra*, our current coordination procedures would come into play and the two users would be protected against mutual unacceptable interference by required distance spacings.⁴⁷⁰ The details of the border band plans will be determined in our ongoing discussions with the Mexican and Canadian governments. One principal goal of these discussions will be to ensure that the capability for cross-border mutual aid communications is maintained. Thereafter, we will address any "double border" issues. Until border agreements are reached, however, 800 MHz licenses in the border area will be conditioned on compliance with international agreements. We further note that Nextel will bear the financial responsibility for the completion of any system modifications

⁴⁶⁵ See Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties, Exhibit D at 2-3; Comments of Consumers Energy to Supplemental Comments of the Consensus Parties at 9.

⁴⁶⁶ See Comments of Boeing to Supplemental Comments of the Consensus Parties at 10-11; Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties, Appendix D at 3; Comments of Pinnacle to Supplemental Comments of the Consensus Parties at 3-4; Reply Comments of Boeing to Supplemental Comments of the Consensus Parties at 8-9.

⁴⁶⁷ See Comments of Industry Canada to Supplemental Comments of the Consensus Parties at 7.

⁴⁶⁸ *Id.* at 6.

⁴⁶⁹ See, e.g., 47 C.F.R. § 90.619 in Appendix C *infra*.

⁴⁷⁰ *Id.*

necessitated by any future international agreements.⁴⁷¹

4. Cost Responsibility

177. Band reconfiguration will be costly. We believe, however, that sole reliance on Enhanced Best Practices to abate unacceptable interference would entail a continuing expense that—over the long term—would eclipse the admittedly high initial cost of band reconfiguration.⁴⁷² Under the Consensus Proposal, and the rules that we adopt today, the cost of band reconfiguration can be accommodated to successfully address the critical interference problems faced by public safety providers. Moreover, we are confident that Nextel is capable of fulfilling its central role in achieving this result, given its demonstrated ability to bear the upfront costs of band reconfiguration.⁴⁷³ The record does not reveal any effective alternative to the one we fashioned here—either by band reconfiguration or otherwise—to solve the instant problem. No other spectrum management approach provided the same assurances of success. Furthermore the plan we are adopting today will preserve the abilities that public safety licensees are likely to need in order to meet their increased Homeland Security obligations.

178. Under the band reconfiguration plan, the principle cost component will be borne by Nextel, which will pay for all channel changes necessary to implement the reconfiguration.⁴⁷⁴ Nextel is obligated to ensure that relocated licensees receive at least comparable facilities when they change channels.⁴⁷⁵ Moreover, a licensee electing to relocate to the ESMR block voluntarily, must receive clear, incumbent-free replacement spectrum. Thus, Nextel shall be responsible for the clearance of any incumbents affecting the replacement channel. If disputes arise concerning the cost allocation, the matter may be referred to the Transition Administrator for resolution; and, failing that, to the Chief of the Wireless Telecommunications Bureau for *de novo* review.⁴⁷⁶

a. Relocation Costs and Remuneration

179. The Consensus Parties estimated the cost of reconfiguring the 800 MHz band at \$850 million. Nextel committed to pay up to that amount conditioned on Commission approval of the Consensus Plan without material change.⁴⁷⁷ We conclude, however, that we cannot reasonably “cap” the amount required for band reconfiguration if completing the reconfiguration process requires more than

⁴⁷¹ In the event that the requisite border area agreements are not reached within thirty-six months of the release date of the Public Notice announcing the start of reconfiguration of the first NPSPAC Region, Nextel shall elect to extend the life of the letter of credit or secure a separate letter of credit for a sum of money equal to that which would have been incurred had the Commission band plan been implemented along the borders without regard to international agreements.

⁴⁷² See ¶¶ 120-121 *supra*.

⁴⁷³ See ¶ 29 *supra*. See also n. 478 *infra*.

⁴⁷⁴ We note that 800 MHz licensees may divide relocation costs with Nextel if they so choose. For instance, we observe that Southern LINC and Nextel are working on an agreement whereby costs for relocating Southern LINC’s facilities may be divided between the two parties. See ¶¶ 164-168 *supra*.

⁴⁷⁵ See ¶ 201 *infra*.

⁴⁷⁶ See ¶ 194 *infra*.

⁴⁷⁷ Supplemental Comments of the Consensus Parties at iv-v.

\$850 million.⁴⁷⁸ First, as discussed above, our band reconfiguration plan differs from that of the Consensus Parties, most particularly with respect to considerations affecting efficient use of the spectrum. In light of these changes, we place less reliance on the assumptions Nextel made when it estimated the cost of band reconfiguration. We did not undertake an *ab initio* analysis of the cost of band reconfiguration but instead carefully analyzed the data contained in the record. In that regard we have taken careful notice of certain sensitive assumptions in Nextel's analysis, which, if varied by only a few percent, greatly affect Nextel's cost estimate.⁴⁷⁹ The one certainty that we derive from our analysis is that it would be unwise in the extreme to proceed with band reconfiguration without making it clear that Nextel is obligated to cover the entire cost thereof, with no "cap."⁴⁸⁰ Thus, if we accepted any cap on Nextel's reconfiguration cost obligations and its estimates proved low—i.e., if we capped costs at \$850 million and that amount was exhausted before the completion of nationwide band reconfiguration—a balkanized 800 MHz band would likely result, in which public safety agencies in one section of the country would operate pursuant to a revised band plan and other agencies would operate pursuant to the current, interference-ridden, band plan. This could seriously diminish public safety interoperability between NPSPAC Regions, and could also impair the ability of non-NPSPAC public safety systems to develop interoperable networks. We also observe that the Consensus Parties themselves admit the possibility that \$850 million may prove inadequate.⁴⁸¹ Thus, when discussing the assurance that the exhausted funds would not result in a half-reconfigured 800 MHz band, they state that: "no incumbent licensees will be required to relocate within a Region...unless funding is available for all licensee relocations required in that Region."⁴⁸² While this addresses the possibility of the incomplete reconfiguration of a single Region, the Consensus Parties are silent on the greater hazard resulting from the funds evaporating before the reconfiguration of all Regions: e.g., a negative effect on inter-region interoperability.

b. Continued Availability of Funds

180. In the *NPRM*, the Commission sought comment on how to guarantee the availability of funding to complete the reconfiguration of the 800 MHz band regardless of the financial status of the contributing party or parties.⁴⁸³ In response, parties suggested how to ensure the completion of band reconfiguration notwithstanding the inability of the funding entity to continue to furnish funds for reasons of bankruptcy or otherwise.⁴⁸⁴ The Consensus Parties, for example, initially proposed that Nextel could secure its ability to fund retuning costs by setting up a separate corporate entity to hold assets securing the Nextel funding obligation. The stock of the entity would be pledged to an escrow agent/trustee, with the

⁴⁷⁸ We take this step pursuant to Section 4(i) of the Communications Act. 47 U.S.C. § 154(i).

⁴⁷⁹ See n. 489 *infra*.

⁴⁸⁰ This is consistent with the Commissions actions in the Upper 200 and Microwave Relocation proceedings. See Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, PR Docket No. 93-144 and Amendment to the Commission's Rules Regarding a Plan for Sharing Costs of Microwave Relocation, WT Docket No. 95-157.

⁴⁸¹ Supplemental Comments of the Consensus Parties at 6 (noting estimate of total costs for relocating public safety licensees is subject to several significant variables such as the number of total radios which will need to be replaced).

⁴⁸² See Supplemental Comments of the Consensus Parties at 12.

⁴⁸³ See *NPRM*, 17 FCC Rcd at 4899 ¶ 45.

⁴⁸⁴ See, e.g., Supplemental Comments of the Consensus Parties at 8; Nextel Nov 3 *Ex Parte*.

power to sell the assets and hold the cash proceeds in escrow for the benefit of the Fund Administrator in the event Nextel failed to meet its payment obligations.⁴⁸⁵ However, this proposal was superseded on November 3, 2003, when Nextel committed to deposit \$100 million in cash into an escrow account created and designated for paying 800 MHz band reconfiguration costs pursuant to the Consensus Plan and securing up to an additional \$750 million for this purpose through an irrevocable stand-by letter of credit.⁴⁸⁶ Nextel claims that this proposal would insulate band reconfiguration funds from any financial reversals that Nextel might encounter, including bankruptcy.⁴⁸⁷

181. Nextel's escrow deposit and irrevocable stand-by letter of credit appear better capable of assuring continued relocation funding than the Consensus Parties' earlier proposal, although we prefer to rely solely on the Letter of Credit. However, we remain mindful of those parties who questioned the Consensus Plan cost estimates, both with respect to the number of systems that would have to be relocated and whether equipment in those systems could be retuned or would have to be replaced.⁴⁸⁸ We also recognize that even small errors in certain sensitive parameters could dramatically increase total relocation costs.⁴⁸⁹ We are therefore faced with the question of who should assume the risk if relocation cost projections prove to be inadequate: Nextel, which made the estimates, or the public, which would suffer the consequences of incomplete implementation of a nationwide 800 MHz band plan. In resolving that question, we note that Nextel has stated that it is "highly confident" in the accuracy of its estimates, which suggests that it perceives little risk in assuming the entire band reconfiguration obligation.

⁴⁸⁵ See Supplemental Comments of the Consensus Parties at 8.

⁴⁸⁶ See Nextel Nov. 3 *Ex Parte* at 3.

⁴⁸⁷ See *id.* at 3; Supplemental Comments of the Consensus Parties at 7-8; cf. *NPRM*, 17 FCC Rcd at 4899 ¶ 45 (seeking comment on safeguards to guarantee that the "then state of finances of a contributing party or parties" would not hinder the completion of band reconfiguration).

⁴⁸⁸ See Comments of Mobile Relay Associates to Supplemental Comments of the Consensus Parties at 6; (no way to determine whether Consensus Plan adequately estimates overall funding needs); Comments of Border Area Coalition to Supplemental Comments of the Consensus Parties at 12 (Consensus Plan does not take into account additional costs that border area licensees would incur); Comments of Small Business in Telecommunications to Supplemental Comments of the Consensus Parties at 2-4 (questioning estimate of \$17,000 per channel for relocation and \$12,000 per channel for rebanding.). See also Comments of CTIA to Supplemental Comments of the Consensus Parties at 10 and Comments of Michigan DIT to Supplemental Comments of the Consensus Parties at 3 (Consensus Plan underestimates number of small public safety systems that would be relocated).

⁴⁸⁹ Nextel's estimates are based on replacing one percent of public safety portable and mobile radios. However, the City and County of San Diego provided estimates that more than thirty percent of its units would have to be replaced. See Comments of San Diego to Supplemental Comments of the Consensus Parties at 12-13. Subsequently, Nextel filed a letter stating that the San Diego estimates were overstated; but that, nonetheless, more than one percent of the units in the San Diego system would have to be replaced. See Letter, dated February 20, 2004, from Larry Krevor, Esq., Nextel to Michael Wilhelm, Esq. Public Safety and Critical Infrastructure Division, Wireless Telecommunications Bureau, Federal Communications Commission. The San Diego system may not be representative inasmuch as it was constructed in 1991 and is still using radios of that vintage. See also, e.g. Reply Comments of ALLTEL *et. al.* to Supplemental Comments of the Consensus Parties at 6-7 (the cost of receiver replacement increases \$78 million for every one percent increase in number of receivers that must be replaced.) See also Comments of Verizon Wireless to Supplemental Comments of the Consensus Parties at 10 and Comments of Preferred Communications to Supplemental Comments of the Consensus Parties at 9-10 (Questioning Consensus Plan estimate that one percent of public safety receivers would need to be replaced) Comments of Ameren to Supplemental Comments of the Consensus Parties at 5 (Consensus Plan proposal of \$150 million to relocate B/ILT incorrectly assumes that relocation would only require the replacement of only five percent of B/ILT equipment).

However, we also believe it is important to protect against the risk of Nextel experiencing an unanticipated financial crisis or insolvency that would impair its ability to fully fund relocation.

182. Because the Commission Plan requires Nextel to shoulder a greater financial obligation than the financial obligation envisioned in the Consensus Plan, we will require Nextel to increase the amount of money irrevocably available to ensure completion of band reconfiguration. Specifically, we will require Nextel to provide an irrevocable letter of credit securing \$2.5 billion.⁴⁹⁰ This letter of credit will serve as the funding source for the costs involved in reconfiguring the 800 MHz systems for non-Nextel licensees and possibly as the source for any payment to the United States Treasury.⁴⁹¹ Nextel must directly pay its own relocation costs as well as such obligations such as the reimbursement of UTAM, the relocation of BAS incumbents and the compensation of the Transition Administrator and the Letter of Credit Trustee. We have provided a model letter of credit at Appendix E, *infra*, and expect that the letter of credit will be issued in substantially the same form set forth therein.⁴⁹² While we require that only one financial institution, acceptable to the Commission,⁴⁹³ issue the letter of credit, we have no objection to the indirect participation of other financial institutions, acceptable to the Commission, if necessary.⁴⁹⁴

183. As described more fully at ¶¶ 198-200 *supra*, the Trustee will draw upon the letter of credit those funds necessary to accomplish band reconfiguration. As part of the process by which the Transition Administrator will certify that band reconfiguration in a particular NPSPAC region is complete—or at Nextel's reasonable request, the Transition Administrator will evaluate the sum remaining available under the initial letter of credit and any subsequent letter(s) of credit issued pursuant to this *Report and Order*. If, at any time, the Transition Administrator documents that the letter(s) of credit does not retain sufficient undrawn funds to ensure completion of band reconfiguration, Nextel will be required to open an additional letter of credit. If, however, the Transition Administrator documents

⁴⁹⁰ We emphasize that the required \$2.5 billion security is not a "cap" on Nextel's obligations hereunder, whether for 800 MHz band reconfiguration or 1.9 GHz band clearance. We further emphasize that this determination does not represent a finding by the Commission that 800 MHz band reconfiguration can, in fact, be accomplished for \$2.5 billion.

⁴⁹¹ See ¶¶ 186 *infra*.

⁴⁹² The model letter of credit provides that the letter will be issued for five years unless it contains an "evergreen" clause. If such a clause is included in the letter of credit and the issuing institution gives notice of non-renewal, Nextel shall ensure that a replacement letter is issued no later than thirty days prior to the expiration date of the letter of credit. A failure to do so shall entitle the Commission to instruct the Trustee to make a draw on the letter of credit for the entire remaining balance thereof.

⁴⁹³ A bank that is acceptable to the Commission to issue the Letter of Credit is a) any United States Bank that (i) is among the 50 largest United States banks, determined on the basis of total assets as of December 31, 2003, (ii) whose deposits are insured by the Federal Deposit Insurance Corporation, and (iii) has a long-term unsecured credit rating issued by Standard & Poor's of A- or better (or an equivalent rating from another nationally recognized credit rating agency); and b) any non-U.S. bank that (i) is among the 50 largest non-U.S. banks in the world, determined on the basis of total assets as of December 31, 2003 (determined on a U.S. dollar equivalent basis as of such date), (ii) has a branch office in New York City or such other branch office agreed to by the Commission, (iii) has a long-term unsecured credit rating issued by a widely-recognized credit rating agency that is equivalent to an A- or better rating by Standard & Poor's, and (iv) issues the Letter of Credit payable in United States dollars. Should the bank's credit rating fall below A- or equivalent rating, the Commission may require Nextel to procure the issuance of a letter of credit in an amount equivalent to that remaining on the current letter of credit by a bank that meets the criteria set forth herein.

⁴⁹⁴ *Id.*

that the letter(s) of credit secures funds in excess of those needed to ensure completion of band reconfiguration, Nextel will be allowed to reduce the amount of the letter(s) of credit. At no point, however, will the Transition Administrator allow Nextel to reduce the total aggregate secured by the letter(s) of credit below \$850 million. We believe that allowing reductions in the letter(s) of credit will relieve Nextel of an unnecessary financial burden and anticipate that Nextel may use the monies freed by the reduction to improve or expand its network, including its operations in the 1.9 GHz band. This would not only improve its service to the public, but the revenues derived from this improved service would strengthen its financial position and serve as an additional hedge against financial reversals that might affect band reconfiguration. At the conclusion of the true-up process, including securing the funds necessary to ensure reconfiguration of the band in border areas, Nextel's obligation to provide security for the cost of 800 MHz band reconfiguration shall terminate and the letter(s) of credit will terminate.⁴⁹⁵

184. The letter(s) of credit shall specify a trustee, acceptable to the Commission, as the beneficiary, which shall administer the funds from the letter of credit and receive the funds from the letter of credit in the event of a Nextel default. Nextel and the Letter of Credit Trustee shall formalize the terms of their relationship with a written contract and/or a trust deed, drafts of which shall be submitted for Commission final review and approval.⁴⁹⁶ On the occasion of a material breach by Nextel of its obligations hereunder, as declared by the Commission, said trustee shall be entitled to draw on the letter of credit as specified in such instrument. The funds shall be devoted to reconfiguration of the 800 MHz band and possibly payment to the United States Treasury.⁴⁹⁷ Neither the Transition Administrator nor the Letter of Credit Trustee will be compensated from funds available under the letter of credit, but will be compensated directly by Nextel.

185. If Nextel is unable or unwilling to fulfill its obligations pursuant to this *Report and Order*, the Commission can approve the use of letter of credit funds to compensate the Transition Administrator and the Letter of Credit Trustee for their services. The trustee shall stand as a fiduciary to the Commission. Letter of credit funds shall be applied first to band reconfiguration of non-Nextel licensees; and then to the relocation of Nextel's facilities as required to conform to the new 800 MHz band plan. Should the funds be insufficient to complete relocation of Nextel's facilities, the licenses of un-relocated Nextel facilities shall automatically revert to secondary status. Pursuant to such secondary status, such unfinished Nextel facilities must not interfere with, and must accept interference from, any other 800 MHz licensee.

186. As described in paragraph 330 *infra*, the Wireless Telecommunications Bureau will issue a Public Notice specifying the amount that Nextel will pay the United States Treasury. If Nextel does not make payment of any amount that it owes within thirty days of issuance of this Public Notice, the amount Nextel owes will be paid from the letter(s) of credit. If the letter(s) of credit do not secure sufficient funds, then, in addition to debt collection remedies that the government may employ, the Commission will determine whether forfeitures should be imposed and/or whether Nextel licenses, included, but not limited to its 1.9 GHz licenses, should be revoked.

⁴⁹⁵ See Appendix E-Annex C, *infra* (Termination of Letter of Credit form).

⁴⁹⁶ The contract will authorize the formation of the "800 MHz Relocation Trust" and the corpus of the trust will be the letter or letters of credit issued pursuant to the terms of this Order. The trust will be permitted to receive and hold draws under the letter of credit to facilitate multiple payments to particular licensees, vendors, contractors, etc., to pay for approved relocation costs. An outline of the key terms envisaged by the Commission are attached hereto as Appendix E-Annex D.

⁴⁹⁷ See ¶¶ 186, 329-332 *infra*.